ICHARD G. HARRIS
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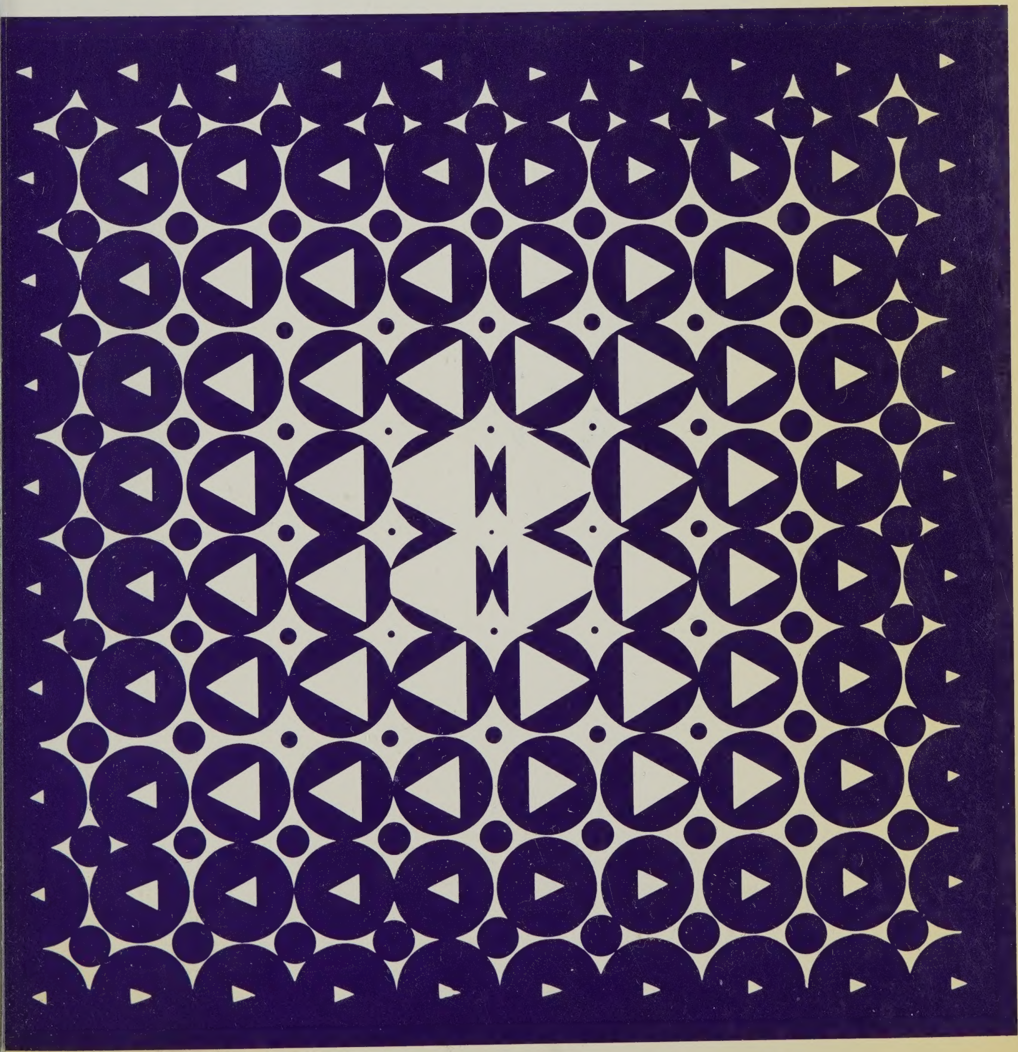
Trade, Industrial Policy, and Canadian Manufacturing

ONTARIO ECONOMIC COUNCIL RESEARCH STUDY



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Contents

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1
Introduction

This book is concerned with a fundamental issue any nation, or province, faces in designing its economic policy in light of the role it wishes to play in the international community at large. The issue is the extent to which trade with other nations is or is not an important part of the nation's total economic activity. A central theme in the history of economic thought is the role that international trade plays in the growth and development of nations. Trade can occur in 'goods,' and this form of trade has received the most emphasis, but it can also occur in factors of production, such as capital and labour, or in more abstract items, such as trade in technology and ideas. Many economists and politicians alike link the remarkable growth in society's GNP, and non-economic indicators such as the growth in individual freedom, to the development of a world trading system. This study undertakes to examine some aspects of the role of international trade in the determination of a nation's economic welfare and economic structure. While much of the discussion is concerned specifically with the Canadian situation, the analytical arguments are quite general and apply to any small open economy.

From the vantage point of late 1982, the future does not seem to hold the promise of the past. The world trading system is in an increasingly unstable situation as one country after another resorts to protectionist policies in an attempt to maintain its own position at the expense of others in a world recession. Much of the trade liberalization which has occurred under the auspices of GATT since the Second World War is threatened by the 'beggar my neighbour' policies of numerous governments. The oil and commodity price shocks of the 1970s had the side-effect of focusing attention on a perceived decline of traditional manufacturing sectors. Associated with

these developments is the increasingly popular reference to a collection of economic policies referred to generally as industrial policy. It is easy to dismiss many of these policies as nothing more than thinly veiled protection, and indeed there is a great deal of truth in this. Yet in some respects the concern with de-industrialization in the manufacturing sector is more than a mere concern that there has been a shift in comparative advantage and terms of trade among both developed and less-developed countries. There is a view of the world reflected in many of these discussions that is not related to the discussion of trade as advanced in the free-market-oriented theories of classical and neoclassical economists alike. Newspaper columns and business journals give the impression that discussions of trade and industrial policy are dominated by those with mercantilist and interventionist views. This book addresses these issues and some of the conceptual and empirical arguments for industrial policy.

The main purpose of the book, however, is to analyse the empirical case for free trade and to re-examine the methodology used in the empirical estimation of the costs of protection. It has often been asserted that economic growth in real incomes was aided considerably by the development of a world trading system. However, the embarrassing fact is that the importance attached to free trade by economists is often a belief hammered into them by years of training based on a tradition of analysing the inherent virtues of resource allocation by the unfettered hand of the free market, as handed down by Smith, Ricardo, and other great classical economists. This 'belief' translates into the assertion that it is 'self-evident' or 'well established' that free trade is a major source of economic growth and economic welfare. This claim is made by most economists, certainly by most academic economists responsible for teaching in universities. One of the points we wish to make in this book is that, by the conventional standards of evidence in economics, the claim is not well-founded. This point is dealt with at some length in chapter 2. That is not to say there is no evidence, only that the 'case for free trade' does not rest on the same kind of objective standards that a proposition such as 'stimulative aggregate demand causes inflation if the economy is fully employed' rests on.

Indeed the situation is much worse. What little work has been done on the subject suggests that the benefits from free trade are rather negligible in quantitative terms (see chapter 2). The policy implications of the view that free trade is not quantitatively significant are important. For example, this

view suggests that erecting trade barriers can cause little harm to the national economy; moreover, such barriers might be quite useful if policy is concerned with other objectives such as protecting the incomes and jobs of labour in an industry hit with import competition. Secondly, it means that a nation does not need to be outward-looking from the purely economic point of view. The domestic economy can be protected at small cost from the vagaries of events, political or economic, in the rest of the world by isolationist trade policy. Finally, in a federal state such as Canada, the logical implication of this view is that if free trade for a country is not important, then economic union of the provinces is not well founded on a desire to achieve mutual economic benefits through trade and economic integration.

Most reasonable persons would agree that some of the above arguments are at worst ridiculous and would certainly not be entertained in any serious discussion of economic policy. Yet events in Canada and abroad suggest otherwise. There have been numerous cases in the last two years of countries raising significant barriers to international trade. In Canada there is considerable evidence that policymakers and citizens generally do not appreciate the consequences of raising strong trade barriers among nations. A few examples will be mentioned. First, there was the general lack of discussion during the constitutional debate of the role of free trade in goods and factors between the provinces.[1] Second, there has been the continued push for an industrial strategy by various groups in business and government. This discussion has gone on as if Canada could pursue unhindered subsidization of selective industries without some retaliation by foreign governments. Such a belief is ludicrous, as any student of economic history knows. Finally, we had the national debacle of the recent National Energy Program and the associated furor over the Foreign Investment Review Agency. Both policies, which have been much discussed recently, were essentially directed to internal domestic goals; neither was geared at interfering with comparative advantage.[2] Yet their impact on the climate for foreign investment is now understood to have been significant. More so than many nations, Canada's fortunes are dependent on access to the world capital market; any attempt to alter our relations with participants in that market must be weighed carefully. We cannot afford to withdraw from the world market for capital. Yet it appears that the designers of these policies were unaware of the possible adverse consequences of their actions.[3] For Canadian policymakers, this was a serious oversight.

In summary, the arguments for and against free trade are not closely tied with general economic policy. On the one hand, there is the apparent strong belief in free trade by some; whenever it suits their purpose, the free-trade arguments are pushed with the greatest vigour. On the other hand, in the discussion of Canadian economic policy these arguments are usually given little emphasis, and the discussion progresses as if Canada, or in some cases a province, were a closed economy.

In the policy discussions there is often, if not always, the overriding concern with economic justice or income distribution. The discussion of trade and trade policy by economists attaches a great deal of importance to these issues. One of the first things taught to a student in an international trade course is that a move to free trade will cause some individuals to gain and others to lose. The case for a national advantage to free trade is that those who gain can more than compensate those who lose. The 'real income' gain to free trade is an aggregate measure of the excess of the gainers over the losses of the losers. In any modern society, however, the institutions and mechanisms for making these transfers are limited and subject to political manipulation. Indeed, any attempt to make such transfers is thought by some extreme free market supporters actually to impede the workings of the capitalist system.

In the normal course of the workings of the world economic system, changes in technology, population shifts, resource discoveries, wars, and a host of other exogenous events continually shift the terms of trade any particular nation faces and alter its natural comparative advantage. This quite routinely creates both losers and gainers. Economic policy is not an exogenous variable, however, and the politicians are elected or thrown out of office by the same people who are affected by these events. The political reality of the situation dictates that the losers are often protected from these external shifts by policies which reduce the income losses that would be suffered otherwise. Protection is a term which covers most such policies when the adverse consequence appears to be generated by the penetration of imports into the domestic market. The reason protection seems to be the natural political outcome is that the gainers from protection are a small and clearly identifiable group with a strong mutual interest who are consequently motivated to take political action; that is, they seek policies which reduce their own economic losses. The losers are consumers at large who must pay for such policies with both higher prices for the goods they consume and in-

creased tax burdens to pay for various sorts of subsidy schemes. The losers are usually not politically active on the issue because the loss on a per capita basis is often small and only vaguely appreciated by the average voter.

The economic efficiency costs of a protection policy are defined as the aggregate income losses to the losers over the gains to the protected. The gains to the protected are defined as the increases in income they experience relative to a situation with no protection. The discussion of economic policy for these reasons more often than not focuses on the losers from a change in external circumstances, and policies are discussed and promoted which aim to protect the losers. Less frequent is discussion as to the general costs to society at large which these policies induce. The success of GATT indicates that among some policymakers there is certainly an awareness of these costs; yet in political and media discussion of these issues, there is the inevitable focus on the losers, as opposed to the beneficiaries of freer trade. It is the purpose of this book to redress marginally this imbalance with a look at the Canadian situation as of roughly the middle of the 1970s, with an emphasis on aggregate efficiency costs.

The central theme in the chapters to follow is a reassessment of the evidence on the costs of protection for Canada. A subsidiary theme is the impact of particular policies, including industrial policies, on the structure of Canadian industry. More than just a reassessment of existing evidence is offered, however. The results of a large-scale empirical study undertaken for the Ontario Economic Council are reported in the core chapters, 4 through 6. This evidence is based on a major methodological departure from existing studies in attempting to quantify the costs of protection. In order to explain what is done, it will be useful to explain what is normal procedure by economists concerned with these issues.

At the heart of the matter is a standard assumption made in almost all economic analysis; this assumption is that both goods and factor markets are perfectly competitive, which means two things. One is that any individual firm exerts no significant market power in the market in which it operates, that is, it cannot significantly raise its price above those of its competitors or offer reduced product quality or service. The second is that the basic technology of production is such that over the relevant range of output produced by the firm, average or unit costs of production are approximately constant. Economists refer to this as a lack of economies of scale. The estimates of the cost of protection typically maintain these assumptions. The

arguments supporting these assumptions are (a) that perfect competition, even if not exactly true, is a useful approximation to the situation, and (b) that the major concern in estimating the costs of protection is not with the individual industry but rather with the resource shifts which occur between industries; neither scale economies nor imperfect competition would significantly alter these shifts.

Within economics one area of specialization has concerned itself with imperfect competition and scale economies: the field of industrial organization. This field takes the industry as a unit of study and does not concern itself with interindustry problems. Among Canadian economists there is a tradition of analysis of international trade with an industrial organization perspective which is not found elsewhere. In the early 1960s, a group of economists including such names as Dales, Daly, Eastman and Stykolt, English, and the Wonnacotts put forth the basic arguments. Probably the most famous - and infamous in some circles - arguments were made by Paul and Ron Wonnacott (1967). They argued that the combination of foreign and domestic tariffs was costing the Canadian economy in the early 1960s approximately 10.5 per cent of GNP. At the time this was an extraordinarily high estimate of the cost of protection. This group of economists has long argued that the costs of protection are much higher than 'traditional' analysis would suggest. Their arguments are now well known and form the basis of the recent Senate Report on United States-Canada Trade Relations (Senate 1982) and the 1975 Economic Council of Canada document on Canadian trade prospects, Looking Outward (Economic Council of Canada 1975).

The basic idea put forward by these economists is that the combination of foreign and domestic tariffs has the effect of producing a domestic manufacturing sector geared primarily toward the small domestic market. Canadian plants have lower absolute volumes of output than their counterparts in the United States, thus incurring higher costs. Second, and often argued as more important, Canadian plants produce a more highly diversified range of products resulting in much shorter production runs. The high costs associated with these short production runs are reflected in either higher prices to consumers or lower returns to domestic factors of production.

There is a mirror image to this problem reflected in the productivity of Canadian industry. A longstanding problem in Canadian economics has been to explain the productivity performance in industry, in particular the approximately one-third to one-quarter gap between American and Canadian produc-

tivity (see Chapter 2). The economists who argue that protection imposes high costs on the Canadian economy due to an inability to realize economies of scale also argue that the same factors explain Canada's poor relative productivity performance. Consequently, if free trade were to be established, Canadian plants would specialize and produce for the world market as opposed to the much smaller domestic market. Consumers would replace some high-priced, Canadian-produced goods which would no longer be produced domestically with cheaper foreign substitutes.

The major difficulty with the industrial-organization view of the costs of protection is that the evidence given and the arguments advanced are not based on a well-formulated economic model or analytical framework. This is not surprising. Imperfect competition and scale economies have not played any significant role in most economic analysis. For example, there is no macroeconomic model which attaches any role to imperfect competition or scale economies. While perfect competition is perhaps an appropriate assumption for an economy like the United States, it is not self-evident that it is justified for the Canadian economy or other small open economies. The important point is that there is a major gap in the analytical framework of economics dealing with the issues of trade and industrial organization. Until this gap is filled it will be difficult to come to grips with either trade policy or discussions of industrial strategy.

Fortunately, in the last five years work by a group of young economists in various countries has been focused directly on these problems. Some of the outstanding contributors to this development are Brander (1981), Helpman (1981), Krugman (1980b), Lancaster (1979), and others. The empirical reassessment of the costs of protection provided in this book is an empirical analysis based on an analytical framework which is in broad agreement with the theoretical models developed by these economists. What is perhaps surprising is the impact the departure from the traditional analysis has on the results obtained. The empirical results suggest that the costs of protection are much higher than suggested by most authors. Second, and perhaps even more important, the predictions as to the pattern of resource allocation induced by protection are quite different from those suggested by the traditional models which economists use.

According to the analysis given below in chapters 3 through 6 the unfortunate consequence is that most of the structural policy models in existence for Canada are seriously misspecified, as are many policy models for other

countries. In short, the analysis is controversial. Until similar analysis is done for other countries on other data sets it must be interpreted with care and treated as preliminary. This is the heart of economic debate, and for the economist the analytical framework developed may prove the most interesting part of what follows.

What of the non-economist or policymaker? Should he identify this as just another case of economists' apparent eternal disagreement? It is now a standard joke that on monetary and fiscal policy there are as many schools of thought as there are economists. Is this now to be the case on long-term structural issues as well? We hope not.

There are three main lessons to be learned from what follows. The first is that the views put forth by Dales, Eastman and Stykolt, the Wonnacotts, and others in their writings in the 1960s stand the test of time and careful analytical scrutiny. The costs of protection to Canada are high and for some of the reasons identified with these economists. These reasons seem no less true today, and if anything are regarded as more important. Second, the structural model of the economy and the adjustment processes which economists routinely use in studying resource allocation could be badly misspecified. To be specific, the traditional doctrines of comparative advantage as developed in the Heckscher-Ohlin neoclassical theory of trade are quite inappropriate for the Canadian economy. This is both a statement about the appropriateness of the conceptual framework and the quantitative difference between the results produced by the two 'models.'

The first two points imply that a whole host of economic studies either are wrong or have to be reinterpreted. The third point, which really follows from the first two, is that economic policy in Canada dealing with long-term structural issues could be seriously misdirected by conventional economic analysis. This last point is not comforting. In chapter 3 the policy issues which emerge are treated in some detail. In particular, the interaction between trade and industrial policy, a very topical issue, and the problem of policy misspecification are considered. It will be shown how policy could be misspecified by an inappropriate view of the market mechanism.

A major part of the book and the appendices report the details of, and the results derived from, an empirically based simulation or policy model of the Canadian economy which is referred to in short as GET (general equilibrium trade model). For the expert, this model is a long-run static general equilibrium model of the Canadian economy which incorporates four novel

features: economies of scale at the plant level; economies to longer production runs within the plant, or diseconomies to diversified product mixes within the plant; imperfect competition within the manufacturing sectors; and a formal treatment of product differentiation. It is a simultaneous-equilibrium model as opposed to a recursive dynamic model. The observations made in this chapter and those which follow are based on the experience with this model. It is sufficiently disaggregated (twenty-nine industries) to make possible fairly detailed policy experiments. Furthermore, because it incorporates a number of details regarding firms, their pricing, product, and entry decisions, it provides a vehicle by which firm-specific policies can be evaluated and by which an assessment of their general equilibrium effects can be made. For example, one policy which is often discussed is the forced 'rationalization' of one sector, i.e., forcing the horizontal merger of firms. In conventional analysis there is no way to get at this type of policy because the firm is a non-entity in general equilibrium theory. There are no cost consequences of horizontal merger. GET itself should be of interest to applied economists working in the area of industry analysis. GET also provides a novel perspective on the interindustry resource allocation problem by incorporating the intra-industry adjustment option.

For those with a major interest in the policy issues and conclusions but little interest in the details of the analytical issues involved or in the methodology used in the study, chapters 3 and 7 are recommended. Chapter 7 in particular contains the major policy conclusions of the study. These are intended to be accessible to the non-specialist economist who perseveres through the jargon. For the economist interested in all but the mathematical and methodological difficulties peculiar to the GET model, chapters 2, 5, and 6 should be added. A specialist in international trade should examine chapter 4, where the details of model construction are presented. A number of appendices detail various results and data construction.

2
The costs of protection: theory and evidence

Introduction

The purpose of this chapter is to review both the theory and evidence on the cost of protection to the economy. The major theoretical developments in the traditional neoclassical model of trade were made in the 1950s and 1960s and widely implemented in empirical work over the last twenty-five years. The purpose will not be to give an exhaustive survey but rather to review the basic developments and their relation to the estimates put together for Canada. After reviewing the Canadian studies and some international studies, the major portion of this chapter will turn to the 'industrial-organization' critique of the traditional cost-of-protection estimates based upon the assumption of perfect competition. After discussing the theoretical issues, the empirical evidence which has been marshalled on behalf of that critique is reviewed. Some methodological comments are offered as to the interpretation of this evidence. Finally, the case studies of the effect of the formation of the European Common Market upon trade and industrial structure are reviewed. These studies are interesting and relevant to the present study because of the emphasis they place on intra-industry trade and efficiency gains at the level of the plant attributed to rationalization as a result of free trade between member countries of the Common Market.

COSTS OF PROTECTION IN THE NEOCLASSICAL MODEL OF INTERNATIONAL TRADE

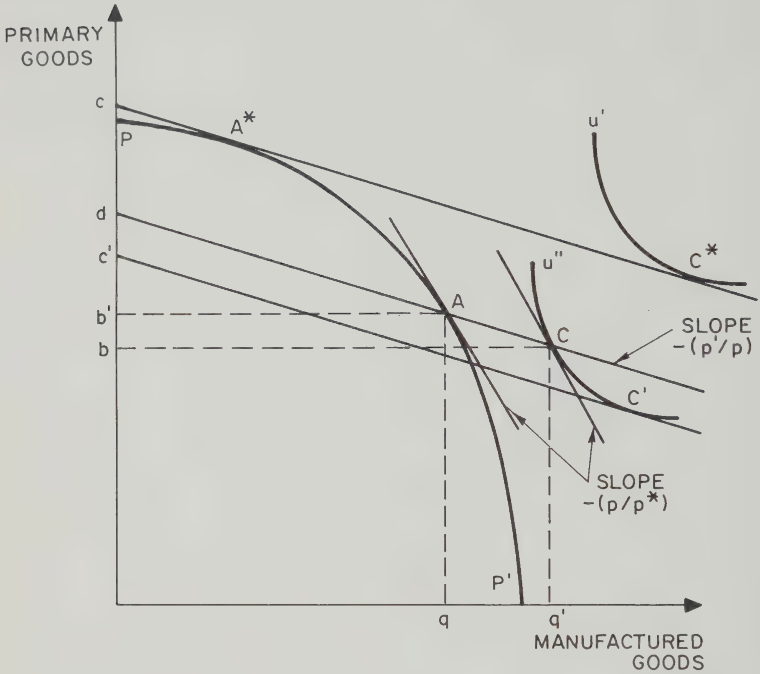
This section will be necessarily brief as the issues are well known to most

economists and presented in a number of textbooks.[1] To recall the basic trade model of the classroom, consider an economy which produces two final goods which are traded. One good will be referred to as the primary commodity and the other as a manufactured commodity. In most cases of interest to the Canadian situation the primary commodity will be exported and the manufactured commodity will be imported. In Figure 1 the production possibility curve PP' is drawn indicating how an economy using its resources efficiently can produce combinations of the two commodities. In the presence of a domestic tariff on imports, in this case manufactures, the economy will produce at point A where the ratio of domestic commodity prices, p/p*, inclusive of the tariff, is tangent to the production possibility frontier. A series of indifference curves to represent domestic consumer tastes are drawn and labelled u', u'', etc. In the initial tariff-ridden equilibrium, consumption occurs at C; the economy imports qq' of manufactures and exports bb' of primary goods. A small open economy is usually defined as one which faces exogenous terms of trade with the rest of the world (ROW). These terms of trade are represented by lines with absolute slope given by the price ratio p'/p*, where p* is the world price of manufactures. A removal of the domestic tariff on manufactures causes the domestic price of manufactures to fall to p'; the economy shifts its resources to the export sector and produces at point A*. Consumption moves to a point C* with a higher level of utility u', and consumers now face a lower relative price of imports.

Economists have long argued that for a small open economy this simple diagram captures most of the salient features of the cost of protection ignoring the distributional issues which have been buried in the background. Corden (1957) and Johnson (1960) very early formulated the problem in the terms given above although it was implicit in the writings of a number of the early classical and neoclassical economists. It is now customary to express the utility gain to society in units which are readily measurable; most commonly the units are either nominal income relative to some fixed set of prices, or alternatively income in units of some convenient numéraire good. The choice of the units in which to express 'real income' gains has been exhaustively discussed in the literature on consumer surplus.[2] The literature on the cost of protection inevitably involves some decision as to the appropriate consumer surplus measure or approximation thereof. In this respect the two literatures are closely related.

In Figure 1 the 'real income' cost of protection is measured in units of

Figure 1
The cost of protection in a two-sector small open economy



the export good by the distance cc'. This is defined precisely as the Hicks compensating variation associated with the move from consumption point C to C*; that is, it is the amount of money one could take away from consumers at the free trade prices and income, and make them as well off as they were in the tariff-ridden equilibrium. It is convenient following Johnson (1960) to divide the total cost of protection into two components. The first component is referred to as the production gain; this is the increase in the value of domestic production at world prices due to the reallocation of domestic resources towards the export sector. In Figure 1 this is represented by the distance cd. The second component is the cost-of-living component or consumption cost to consumers of higher import prices due to the tariff. In Figure 1 this is distance c'd; it measures how much additional income consum-

ers could give up, in units of the numéraire good, if they were to face undistorted world prices and achieve the same level of welfare as in the initial tariff-ridden equilibrium.

There is one significant change to this analysis which must be made if the removal of the tariff, or any other policy change for that matter, causes the terms of trade facing the economy to change. For example, if the quantity of Canadian goods sold abroad depends upon the price consumers of those goods must pay, then we say the demand for Canadian exports is less than perfectly elastic. If this is the case and a cut in the domestic tariff occurs, then the terms of trade, or the ratio of export prices to import prices, are expected to 'move against' the tariff-cutting country.[3] As resources move into the export sector and output expands there, the price received for these exports falls. Thus the terms of trade are said to have moved against the country in question. There is a welfare loss because the country's exports now sell for a lower price; this loss can be approximated by the quantity of goods exported multiplied by the price reduction. In principle the terms-of-trade effect can actually swamp the efficiency effect and produce a negative net welfare gain.[4]

In many cases one is concerned with the effect of the combined removal of domestic protection and the protection by foreigners of their own industries. If Canada's exports are price-sensitive, a removal of foreign tariffs will result in increased demand for Canadian exports. This by definition involves an improvement in the terms of trade at the initial quantities exported; to sell the same amount exporters can now charge higher prices. In the final equilibrium of course it may turn out that export prices are actually higher than they were initially.

These theoretical measures of real income changes, while quite simple, are enormously difficult to estimate. There are numerous empirical problems even if one accepts the general theoretical framework as valid. The first is that the simple two-sector model given above is not appropriate for the 'real world' in which trade takes place in literally thousands of different commodities. To do empirical work it is inevitable that some aggregation across commodities must be done. Aggregation can be avoided to some degree by resorting to a partial equilibrium characterization of the costs of protection. We now illustrate the basic partial equilibrium approach.

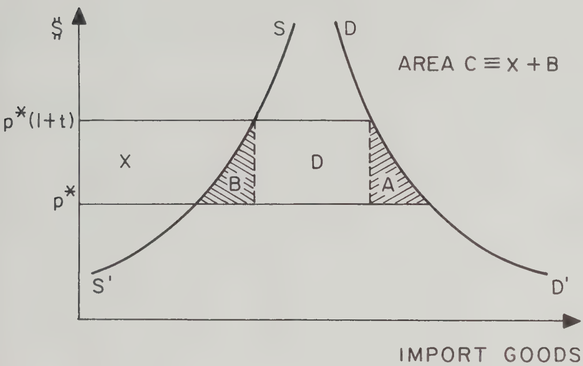
In Figure 2 the domestic market for a single import good is drawn. The curve DD' is the domestic demand curve; SS' is the domestic supply curve;

p^* is the world price and the horizontal line at $p^*(1+t)$ is the perfectly elastic supply of imports at the world price plus domestic tariff, tp^*. In a partial equilibrium framework the welfare cost of this single tariff is represented by the areas A plus B. Area A is the consumer surplus lost due to the higher prices of imports as a result of the tariff. Area B is the producer surplus lost due to the tariff; it represents the value of resource waste because of excessive output in the import sector. Area C is sometimes referred to as the cash cost of the tariff. It is the amount of money that consumers end up paying for goods in excess of what the same quantity of goods would cost were they provided at world prices less the revenue collected through duties. The cash cost of the tariff has no particular welfare significance although it may be of obvious political significance given that it represents what consumers may perceive as the direct cost to them of the tariff.[5]

It is worth emphasizing that the impact of the tariff on government revenues is not directly welfare-relevant in this framework. This is easily represented in this partial equilibrium framework. The tariff raises duty revenue by an amount given by the area D. A removal of the tariff causes government revenues to decline by this amount. In the measurement of deadweight loss this does not appear as either a gain or a loss as it is assumed to represent a pure transfer; in this case the transfer is from taxpayers to consumers of the import good. In some analyses it is required that the government budget be balanced and that lump-sum taxes be excluded from the feasible set of policy instruments. Thus a reduction in duty revenue must be offset by an equal increase in sales or income tax revenue. Most of the empirical work done on the cost of production does not report balanced budget real income losses. There are two reasons for this. First, for Canada the fraction of government revenues raised through duties on imports is insignificant. Second, the concept of a deadweight loss is in one sense an 'ideal' concept; it measures the resource cost of economic policies assuming the existence of an ideal distributive device. Finally, from a practical point of view, deadweight loss is much easier to estimate than a balanced budget resource cost.

With this in mind the practical problems of measuring the costs of protection in a partial equilibrium framework boil down to estimating the triangles A and B in Figure 2. In practice this is done by examining a large number of markets, estimating the triangles in each market, and then summing them. The information required is knowledge of the tariff rate in each market, do-

Figure 2
Partial equilibrium diagram of the cost of protection in a single market



mestic production, domestic consumption, and total imports, together with the elasticities of the domestic supply and demand curves. With this information it is possible to use the 'Harberger methodology' to estimate the relevant resource costs.[6] There are numerous subtleties which we do not want to understate in this type of analysis, but roughly speaking what is done is as stated above.

A major problem with the partial equilibrium approach is that the numbers are potentially quite different from those a 'true' general equilibrium calculation would give. The problems are that the supply and demand curves do not incorporate the general equilibrium effects of a tariff removal. For example, the removal of a tariff on the auto industry results in lower domestic production of autos. Consequently labour must leave the auto industry and find employment elsewhere. This in turn causes a change in the economy-wide wage, which has subsequent effects on all other industries. Now it is probably useful to argue that the partial equilibrium approach is reasonable if one is interested in the resource loss from a single tariff in one industry which has a small share in the economy's total value added. In the case of changing the total tariff structure of the economy it is likely that the partial equilibrium methodology is subject to large errors.

The question remains whether it is possible to obtain a general equilibrium estimate of the resource cost of a tariff structure. It turns out that it

is possible, but not surprisingly the informational requirements are substantial. The approaches taken involve one of two methods. The first is an approximation method that has not been widely used so it will not be discussed here.[7] The second approach is actually to construct a model of the economy and then to use the model to estimate the costs of protection. In the last decade this has become an increasingly popular approach and has been used in a number of studies.[8]

The difficulties with the general equilibrium (GE) approach are numerous. Applied general equilibrium models are expensive to construct in terms of both man-hours and data requirements. The technology required of these models is large-scale computer simulation; there has been enormous progress on this front in recent years so that it no longer is a major barrier although cost is still a big factor. Finally, the actual size of the model itself can be a problem in that the investigator has difficulty explaining his results. This effect, in which the model becomes a 'black box' from which results are pumped out with little explanation, often inhibits an understanding of the basic economic forces at work. The investigator comes to believe the size and complexity of his model is a substitute for understanding.

Nevertheless, despite these problems, GE models are now widely used and are valuable tools for policy. The GET model developed later in this book is one such model, although in a different spirit than the competitive general equilibrium models. The general equilibrium models are capable of answering a number of questions that partial equilibrium analysis cannot. Perhaps the most important of these is the impact of policy changes on factor prices; the market returns to land, labour and capital. Changes in these prices are crucial to explaining interindustry shifts of resources and the income distributional consequences of policy changes. Second, general equilibrium analysis can incorporate a more detailed description of the production structure of the economy; most notable in this respect is to account for the use of intermediate products or the input-output structure of the economy. Thirdly, general equilibrium analysis can incorporate the substitution possibilities which exist between goods and factors at the level of the individual firm and consumer. To put it another way, partial equilibrium analysis incorporates market elasticities which reflect these underlying substitution effects. General equilibrium analysis deals with them directly. Take an obvious example - the rise in the price of energy. A partial analysis of the energy market would look only at the implied reduction in demand for energy such a

price rise would entail. A general equilibrium analysis would focus on the induced substitution of other productive inputs as a result of the energy price shock and the consequent change in the prices of factors and goods and the subsequent sectoral reallocation of resources. In short, the costs of doing an applied general equilibrium analysis often are justified by the realism of the results and the scope of questions capable of being answered.

A SURVEY OF EMPIRICAL ESTIMATES OF THE COST OF PROTECTION

The purpose of this section is to survey briefly the estimates of the cost of protection which have been done on the basis of the 'conventional' trade models, that is, models in which economies of scale and imperfect competition are explicitly absent. These methods include both partial equilibrium 'triangle' procedures and full-scale general equilibrium models. No attempt is made to survey the entire literature. A summary of the literature up to the early seventies is provided by Corden (1975), and the early literature is summarized in Johnson's (1960) well-known paper. First some international studies are summarized, then attention is focused on the Canadian studies. It is worth recalling that in all cases the authors strongly qualify their results by emphasizing that they are crude and based on incomplete information about elasticities, technology, and so on. They are intended only as 'ball park' figures. Thus little emphasis is to be placed upon the absolute dollar number attached to protection costs. What is significant, though, is the order of magnitude of the differences; for example, an estimate of 0.10 per cent of GNP versus 2 per cent of GNP versus 10 per cent of GNP.

International studies

The Kennedy and Tokyo Rounds of GATT provided impetus for a number of studies attempting to estimate both the impact and the welfare costs of the reduction in tariff and non-tariff barriers to be carried out under these regulations.

Magee (1972) used the partial equilibrium Harberger-Johnson methods to estimate the effect of multilateral tariff cuts on the U.S. economy. The study was quite careful, with attempts to correct for transition costs, aggregation bias, and growth. He estimated the average annual cost of American import restrictions to be between $3.3 billion (1971 US dollars) and $5 billion. The

cost of foreign tariffs on the exports of manufactured goods cost the United States only $300 million to $500 million a year. He estimated the total cost to the United States of all trade restrictions to be between $7.5 billion and $10.5 billion per year. As a percentage of American GNP these numbers are very small, the cost of all restrictions on trade being less than 2 per cent.

Deardorff and Stern (1979, 1981) have constructed a massive general equilibrium model of the world economy consisting of thirty-nine countries and twenty-nine industries. It was initially used to investigate the impact of the Tokyo Round changes. The complexity and size of this undertaking is impressive. The model is not a 'true' neoclassical model in that money wage rates are fixed and unemployment can occur in equilibrium. The input-output technology is of the fixed-coefficients variety and exchange rates are flexible, adjusting to restore balance of payments equilibrium. They estimate the Tokyo Round changes of an average tariff cut of 6 to 8 per cent to yield a welfare gain of about $1.1 billion to $4.3 billion. This is less than one-tenth of 1 per cent of the combined GNP of all countries in the model.

Another impressive set of studies consists of those conducted by Whalley and his co-authors. One such study is Brown and Whalley (1980). They use a full competitive general equilibrium model with all prices being flexible. One of the other advantages of their work is that the welfare indexes are exact; that is, they come from hypotheses regarding the structure of consumer preferences directly, rather than Harberger-type approximations derived from demand curves. The Brown and Whalley model divides the world up into four major trading areas: the U.S., the E.E.C., Japan, and the rest of the world (ROW). They find the world gains to the Tokyo Round to be very small - about $0.8 to $3 billion (1973) U.S. dollars. A complete multilateral cut yields about $20 billion U.S. per annum, which on a world GNP of approximately $1200 billion is about 1.6 per cent. The most interesting result from the Brown-Whalley model is the significance of terms-of-trade effects emanating from the various proposals in the Tokyo Round. These are very large compared to the aggregate welfare gains and imply there are both big winners and big losers from partial tariff reduction.

Canadian studies

There have been numerous Canadian studies beginning with Young's (1957) estimate of the 'cash cost' of the tariff. A number of these studies have been

surveyed elsewhere.[9] Those studies incorporating the industrial organizational factors will be covered below. The focus here will be on two relatively recent studies, both in the general equilibrium tradition.

One of the most impressive Canadian studies in the neoclassical tradition is Williams (1976a), which uses a highly disaggregated linear programming model of the Canadian economy for 1961. He focuses on the production cost; that is, the cost of production is measured by the loss in the value of domestic production due to the presence of protection. This is equivalent to the true cost of protection under his hypotheses, which are that consumption of different goods occurs in fixed proportions. Williams's results are summarized in Table 1.

It is interesting to note that his results give numbers which are actually reasonably large compared to other studies. For example, he finds that reducing U.S. and Canadian tariffs could yield either a 9 per cent increase in the value of investment goods or a 4 per cent increase in the value of consumption goods. There is no terms-of-trade effect. Canada is assumed to be a strict price-taker in its export market. Even with a competitive model, the results might be an overstatement because of the exclusion of a terms-of-trade effect.

Boadway and Treddenick (1979) constructed an empirical general equilibrium model similar in many respects to that of Williams with the important addition of extensive substitution possibilities in production and less-than-perfectly-elastic demand for Canadian exports. They consider only the possibility of unilateral cuts and get extremely small welfare losses from cutting the Canadian tariff; the losses are on the order of 1.0 to 0.0 per cent. There are two explanations for this result. One, an argument from the 'theory of second best,' is that because tax distortions exist in the system, removal of distortions such as tariffs is not necessarily welfare-improving. The other is the possibility of an unfavourable change in the terms of trade. Boadway and Treddenick argue that the latter is important. Unfortunately, they did not compute the gains to foreign tariff reductions. The Boadway-Treddenick result, though, is quite significant because, given the similarity of their model to Williams's on the technology side, it suggests the terms-of-trade effect may be significant in the Canadian case.

TABLE 1
Cost of Canadian and U.S. tariff

	Consumption Cost $(000)a.	%b.
Canadian tariff = 0	342,995	1.36
U.S. tariff = 0	511,701	2.03
Both tariffs = 0	1,002,330	3.97
	Investment Cost $(000)	**%c.**
Canadian tariff = 0	770,344	5.33
U.S. tariff = 0	981,727	6.79
Both tariffs = 0	1,318,727	9.12

Notes:

a 1961 Canadian dollars
b percent of value of consumption produced in base equilibrium
c percent of value of investment produced in base equilibrium

SOURCE: Williams (1976a, 30)

THE INDUSTRIAL ORGANIZATION CRITIQUE

Criticisms have been levelled at the theoretical and empirical work on the cost of protection in small open economies discussed in the preceding sections. Their major thrust is that the presence of imperfect competition and scale economies can substantially alter the type of results obtained both theoretically and quantitatively. Furthermore the difference is more important the smaller the economy is in absolute terms and the more open the economy.

At the heart of the criticism is the observation that structural conditions in an industry prevent the market from being perfectly competitive in a conventional sense; the structural condition which has been focused on most by those interested in the interaction between trade and competition is the possibility of economies of scale in production. Large-scale economies such that the minimum-size efficient firm is large relative to the market are said to preclude an equilibrium with large numbers of firms, so that imperfect competition is a likely state of affairs.[10]

The significance of protection in such a context is that it is possible to turn a large world market in which competition is viable into a number of small domestic markets in which competition is not viable. This is true of both foreign and domestic tariffs. Domestic tariffs prohibit foreign competition and promote firms which are geared toward a smaller domestic market. This results in both a lesser degree of competition and an inefficient production structure because firms do not realize economies of scale.[11] The foreign tariff is also perceived as being responsible for many of the same problems. In particular, foreign protection means that domestic firms could not get access to the foreign markets; this access, given a small domestic market, may be necessary to realize economies of scale and raise the productivity of factors employed in domestic manufacturing. The Wonnacotts (1967) in particular argued that the foreign tariff was the cause of Canada's inefficient manufacturing sector, or as they put it 'the cost of the Canadian tariff is the foreign tariff.'

Most of these arguments are rather informal and intuitive by contemporary standards of economic analysis. The proponents of these views have in mind some model of the state of market competition both before and after a trade liberalization. Unfortunately their particular view is never carefully articulated. As we shall see the evidence for Canada is overwhelming that our manufacturing sector has been inefficient relative to that in the United

States. The source of their concern was, and is, real. In the years which have passed since the writings of these authors the field of industrial organization has made considerable progress. One might summarize recent literature as saying it is important to exercise caution when making predictions about the outcome in an apparently imperfect market structure. There have been relatively few applications of industrial organization theory to the sphere of international competition, but it naturally follows that the same amount of care is called for there.[12]

The lack of explicit theoretical models has resulted in a certain amount of confusion as to what exactly is going on in the industrial-organization view of protection. Critics of the Eastman-Stykolt-Wonnacott (ESW) view often raise the following basic point: if economies of scale exist and are so important, since ESW assume that by removing tariffs some domestic firms will compete abroad and realize these economies of scale, why do the same firms not do it before the tariffs come down? Why do they not specialize their plants, cut prices, and produce for both the domestic and export markets? There are clearly situations in which foreign tariffs are not so high as to prevent such a strategy from being profitable under the conditions hypothesized by ESW. This is a good question which deserves an answer.

Before providing an answer it should be pointed out what the critics predict. They argue that the removal of the domestic tariff would simply destroy the domestic manufacturing sector. Domestic firms could not compete with aggressive foreign competitors who have access to large foreign markets. Furthermore there would no longer be any incentive for foreign firms to set up branch plants so that a current source of domestic employment would disappear. With respect to the foreign tariff the situation would be no better. Domestic firms are not inherently export-oriented. There is no reason a manufacturing concern should locate in Canada rather than in the United States where it is closer to the major market. Consequently export-oriented industries would locate elsewhere, and the manufacturing sector as we know it would disappear.

In responding to these critics it is worth noting that their sense of general equilibrium is lacking. Canada is endowed with immobile factors of production, both nationally and regionally. In long-run equilibrium these factors of production must be employed somewhere. In particular, independent of any of the industrial organization complications, it is unlikely the Canadian manufacturing sector would disappear under free trade. Conven-

tional comparative advantage arguments indicate that some of our industries would survive, albeit in a different form. The work of Williams (1976a) is quite important in this respect. He demonstrates clearly that under very conventional assumptions Canadian manufacturing would not disappear even if all domestic industries were forced to sell at world prices.

The key point of the critics is the argument as to why some of the export industries do not rationalize more than they have and compete aggressively abroad. There are two answers to this question. First, Canadian entrepreneurship is a scarce resource which must be allocated across entrepreneurial activities just as any other resource must. In the presence of protection it is more profitable for that resource to be employed in domestic-oriented industries. The second answer is more contentious. The basic question could be rephrased as 'why do the export industries not rationalize and engage in aggressive price competition?' A similar question comes up repeatedly in industrial organization. We observe industries with relatively few firms, i.e. those which are concentrated, earning above-normal profits with prices above long-run unit cost. It would be immensely profitable for any one firm to cut prices and take over the market if it could be assured that other firms would not retaliate. This is the central point. Firms are immensely afraid of severe price competition.[13] Existing firms do not rationalize and engage in price competition because of the retaliation it is likely to invoke. The presence of the domestic tariff is a strong force reducing price competition in import-competing industries.

For a firm selling to an export market the fear of price competition is equally great. The ESW view is predicated on the notion that removal of protection would induce a change in the state of competition. Domestic firms would find it profitable to enter foreign markets and engage in some price competition; a great deal of the price competition would follow quite naturally because of the changes in cost which would result from changing domestic factor prices. While it is possible to make some predictions as to the long-run outcomes of a change in the state of protection, economists have very little to say about the dynamics of the process. It is not possible to predict which firms will survive, which will expand, and which will contract; or how firms will adjust the mix of activities they pursue in foreign and domestic markets. The answer to the critics is therefore necessarily incomplete.

What economists can say is that, in the long run, prices and quantities must adjust so that markets clear and investment earns the same return

everywhere; this is consistent with only some patterns of economic activity. This pattern will be dependent upon the assumptions as to how firms compete with one another, so some care must be made in justifying these assumptions.

INDUSTRIAL ORGANIZATION AND THE COSTS OF PROTECTION

We now attempt to identify, in a relatively crude way, the possible real income costs of protection which can emerge in a world with scale economies and imperfect competition. These fall into a number of categories, and no attempt is made to review them all here. Rather, the discussion focuses on those which are relevant to the subsequent empirical analysis. The following are discussed in the order listed:

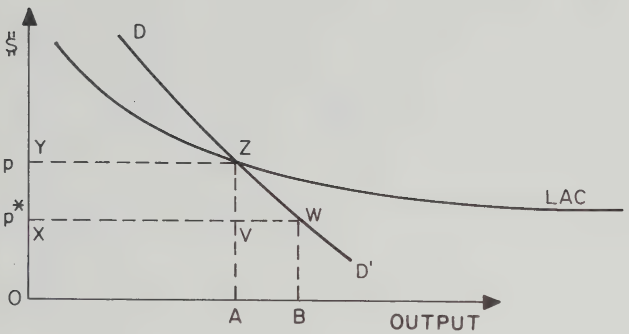
- the cost of the domestic tariff in import-competing industries,
- the cost of the foreign tariff in export industries,
- the Chamberlinian excess capacity problem,
- the productive efficiency gains due to intersectoral resource shifts with rationalization,
- product differentiation and intra-industry trade.

All these issues are central to the industrial-organization view of the costs of protection. The discussion is relatively brief in each case and is intended to give the reader a feel for the basic problem rather than a detailed analytical treatment.[14]

The cost of the domestic tariff with scale economies

The treatment here is partial equilibrium and does not deal with intersectoral resource shifts or factor price changes which might occur as a result of a removal of the domestic tariff. The basic analysis can be presented in a partial equilibrium diagram of a single import-competing industry. In Figure 3 the demand curve for an import good is drawn with world supply perfectly elastic at price p*. The presence of a domestic tariff raises the domestic price to p. In the figure as drawn, total domestic demand is met by a single domestic firm with price equal to average cost, and output equal to OA. If the tariff is removed consumption will rise to OB and prices will fall to p*. The real income gain in this case is given by the area XYZW.

Figure 3
The cost of the domestic tariff with scale economies



It is evident that the major portion of the cost of production is accounted for by the rectangle XYZV; this is the gain to consumers as a result of the lower prices on their initial consumption OA. Without scale economies this rectangle does not appear in a cost of production calculation because it is either a transfer from consumers to the government or a transfer to domestic producers in the form of producer profits or a transfer to immobile factors of production in the industry. In the case discussed here, the resources which were employed in the domestic industry are released and employed elsewhere more efficiently by assumption. To be precise, the economy was initially spending OYZA to produce output OA for consumers. This amount of resources has been released for production elsewhere and replaced with expenditure on foreign goods of amount OXVA; the difference represents a pure efficiency gain. This gain is sometimes referred to as a 'technical efficiency' gain or a 'dynamic efficiency gain.'

The above analysis can be changed in a number of ways including allowance for some initial imports and including many domestic firms. The basic result still stands. A cut in the level of domestic protection means that inefficient and high-cost domestic production is replaced with either low-cost foreign imports or equally efficient domestic production; the latter can occur when a cut in the domestic tariff forces 'rationalization' of the domestic industry. How might this occur?

Three possibilities emerge. The first is that industry production can

become more efficient by reducing the number of firms, or plants in this context, providing the domestic supply. With fewer firms all can produce at greater output levels and hence at lower unit cost. This raises the question why competition among firms did not produce this result. We return to this question later. The second possibility is that some inefficient domestic firms which previously produced only for the domestic market now become export-oriented and realize scale economies by producing for the world market. This is certainly a possibility and one which emerges only because of the presence of scale economies.

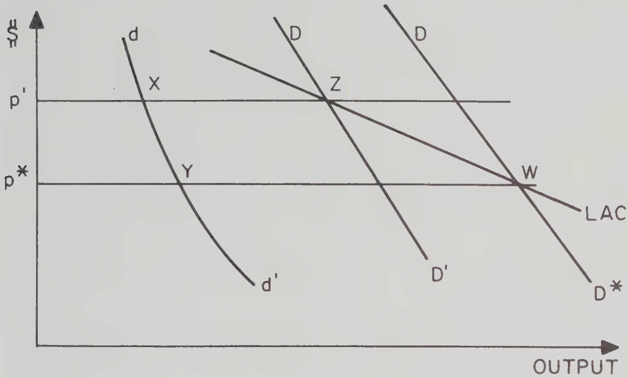
Another source of rationalization is the presence of horizontally and vertically diversified multi-product plants. In the tariff-ridden equilibrium the average plant produces a range of products for the domestic market; for example, a paper products plant might produce ten different types of paper products. Now what happens if the tariff is removed on paper products? It is argued that horizontal specialization will occur within the plant. The plant will now produce only four paper products and as a result achieve longer production runs and reap the associated economies. The six paper products which were previously supplied domestically will be supplied by imports. It is not possible to illustrate this effect diagrammatically in any simple way, but the general effect will be similar to the pure scale economies case in the single product plant illustrated above.

Economies of scale in export industries

The impact of protection by foreigners on domestic export industries has been considered by a number of commentators to be one of the most important factors preventing the rationalization of Canadian industry. The basic industry analysis can again be presented graphically.

In Figure 4 we have drawn the domestic and total demand curves for a single product supplied entirely by one domestic firm. For simplicity assume the firm follows an average cost pricing rule; thus any changes in real income will show up as changes in consumer surplus and not producer surplus. The total demand curve is given by DD' and the domestic demand curve by dd'. The presence of the foreign tariff, and the lack of price discrimination between the domestic and foreign market, implies that domestic consumers end up paying the foreign consumer price less the foreign tariff. Call this price p'. Removal of the foreign tariff shifts the demand curve of the ROW out

Figure 4
Removal of a foreign tariff – effect on export industry



and results in the total demand curve shifting out to DD*. This means that given average cost pricing the price to all consumers falls to p*. The domestic real income gain is given by the area p*p'XY. The significant portion of this real income gain is given by the amount of price reduction due to realized scale economies times the initial quantity of the good consumed domestically. Foreigners benefit also by the scale economies effect; indeed their benefit can be approximated by the area YXZW. This latter effect is quite important; the gains to foreigners from their own tariff reduction include not only the conventional gains but also the gains they realize by importing from an industry which is subject to increasing returns. That is, by increasing their imports the pre-tariff price of the good actually falls.

In much of the policy discussion of the benefits of promoting export industries, little mention is made of the benefit to domestic consumers; it seems that export industries, or trade surpluses, are valued in and of themselves. Is there something more to the argument than a bad case of mercantilism? In the case of increasing-cost industries the removal of the foreign tariff results in a direct transfer from the foreign treasury to domestic factors of production in terms of increased producer surplus. Is there anything analogous to this in the case of decreasing-cost industries?

To keep things simple imagine an export industry which produces a good that is not consumed at home; thus the relevant demand curve is simply the

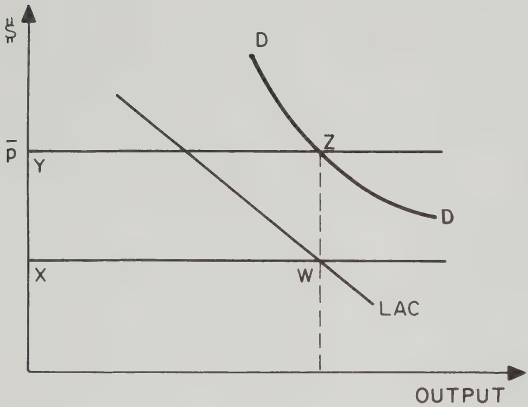
foreign demand curve. If price is set at average cost, removal of the foreign tariff results in the accrual of benefits entirely to foreigners in this partial equilibrium framework. The case for benefits from a reduction in foreign duties in this instance thus hinges on the presence of rents accruing to domestic producers. These rents must necessarily be monopoly rents defined as the ability of producers to keep selling price above average cost in the long run. For example in Figure 5 we see that if domestic producers can keep their selling price constant in the face of a cut in tariffs abroad, even though foreign consumers now pay less, the domestic real income gain is given by the area XYZW. This is simply the value of unit cost reductions on total sales as a result of realizing scale economies; it will show up as above-normal profits to the exporting industry. As in the case of an increasing-cost industry, it might be interpreted as a transfer from the foreign treasury to domestic firms.

Of the two sources of gains in export industries, gains to domestic consumers through price reduction and gains to domestic producers through increased profits, it is difficult to say which is likely to be the more important in practical terms. If free entry in the industry prevails, the presence of monopoly power is likely to be transitory, and consequently the only benefit which accrues domestically is that which accrues to domestic consumers through lower prices. This is an important point. Export industries give rise to benefits from the removal of foreign tariffs only to the extent that they also have domestic consumers. This is all in the context of a partial equilibrium model with fixed factor prices, of course, and later we shall return to deal with the intersectoral problem and the determination of factor prices.

The Chamberlinian excess-capacity problem

The discussion so far has been free of any behavioural assumptions as to pricing or entry behaviour in the industry. Since Chamberlin (1962) it is well known that with free entry into an industry and some degree of decreasing cost, a particular inefficiency arises which is known as the 'excess-capacity problem.' In Figure 6 a cost curve for one firm is depicted in equilibrium. By equilibrium we mean that the firm is setting prices with respect to a perceived demand curve and profits in the industry are zero, so that no incentive exists for firms either to enter or to leave the industry.

Figure 5
Removal of a foreign tariff – rents to export industry

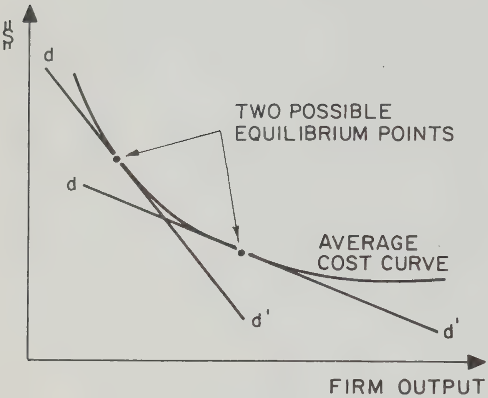


With decreasing costs the equilibrium is characterized by a particular inefficiency. The same industry output could be delivered at lower unit cost by having fewer firms in the industry. Thus the industry is said to have excess capacity.[15]

In the context of an economy engaged in trade and one in which scale economies are important, the excess-capacity problem takes on particular significance. It is generally thought that the excess-capacity problem will be important in markets in which minimum efficient scale (MES) is of significant size relative to demand, yet the size of the market is sufficient to support the existence of enough firms to make the market relatively competitive. With very large market sizes, perfect competition is the likely outcome and the excess capacity problem will disappear. The small open economy subject to protection in its import-competing industries is particularly vulnerable to excess-capacity difficulties. The existence of protection results in small market size which exacerbates the excess-capacity problem.

Curiously enough, removal of protection does not necessarily lead to less excess capacity. The argument hinges on the optimal pricing rule for a firm facing a downward-sloping demand curve, where the firm's demand curve is understood to incorporate the perceived reactions of its competitors. The general rule is that the firms will set a markup on marginal cost which is

Figure 6
Chamberlinian problem



inversely related to the absolute value of the elasticity of the firm's perceived demand curve.[16] Thus a firm with a more elastic demand curve will set a relatively lower markup on marginal cost. For a firm with declining average cost, lower markups together with zero profits implies that it must be producing at greater levels of output. Thus, removal of protection will result in the firm and industry producing at lower unit cost if it implies firms perceive relatively more elastic own-demand curves. This will result in lower markups on marginal cost and the realization of greater scale economies in the individual firm.[17] This might be thought of as the most reasonable outcome, but there is no a priori reason that a removal of the domestic tariff could not actually lower the perceived elasticity of the individual firm's demand curve.

The significance of the excess-capacity problem is thought by some to be questionable.[18] It is argued that industries with homogeneous goods and demand-cost conditions such that MES is large will not be competitive in the Chamberlin sense. The more probable outcome is that entry barriers implicit in such a market will result in small numbers competition. It is not obvious in this situation that excess capacity will be the outcome. There are very few models of oligopoly and international trade, so we have little analytical argument to rely on. Nevertheless, as we shall see, the evidence on excess capacity, or suboptimal scale, for the Canadian economy is substantial. Does this imply the industries in which inefficient scale is evident are necessarily

monopolistically competitive? Not likely. Even if the industry is oligopolistic, provided the market size is sufficiently small, one could get excess capacity. Increasing the market size to the existing oligopolists might result in less excess capacity simply because these oligopolists now spread their fixed costs over a larger market size and not necessarily because of a competitive effect from a larger market. In summary, the choice between oligopoly and monopolistic competition as a description of market structure is really a matter of degree unless the dynamics of entry and exit are explicitly accounted for.

Intersectoral shifts and efficiency gains

The last two sections have been concerned with a partial equilibrium analysis of protection in the presence of scale economies in a single industry. In this section we examine the impact of removing protection if there is more than one industry, which is characterized by scale economies. An optimistic view would be that removal of protection would lead to an expansion of both industries. But if a country has fixed resources, and full employment prevails both before and after, then expansion of both industries will not be possible. Factor prices will adjust such that the relative profitability of the industries will differ. One industry will either contract or possibly shut down.

The basic question to be answered is whether the possibility of intersectoral shifts with the concomitant change in factor prices means that the partial equilibrium estimates of the costs of protection are too low or too high. This is a question which has not received much attention by trade economists, but it is crucial. We will argue that it is likely the real income gains due to multisectoral shifts with scale economies are larger than the partial equilibrium estimates, even if these incorporate scale economies in the relevant market. Intuitively, the reason seems quite simple. Economies of scale in at least one of two industries means that changes in the mix of output between the two industries results in changes, at constant factor prices, of the relative and absolute efficiency with which factors are used in each industry.[19] Suppose that there are scale economies in both industries. The contracting industry experiences an absolute decrease in factor efficiency, and the expanding industry an absolute increase in factor efficiency. The second-round effects of these changes in interindustry factor efficiency are predictable. The industry which experienced an absolute increase in efficiency will expand even more, and the industry which experienced a decrease will contract fur-

ther. Furthermore the factors of production which are used relatively intensively in the expanding industries either will experience an increase in their prices or, if possible, will be imported from abroad.

The particular case which is relevant for Canada is the following combination of factors. First, the increasing-return industries are generally capital-intensive, and many of those industries which are constant-cost or increasing-cost are relatively labour-intensive; the usual examples of the latter include textiles, clothing, footwear, and so on. Second, physical capital is mobile and can be imported from abroad, or exported for that matter. Consequently, the factor price of capital is set by conditions abroad, and not in Canada. Ignoring the resource extraction industries, this means that the major burden of adjustment in terms of factor price changes must fall on the Canadian real wage.[20] Third, labour-intensive domestic industries tend to be heavily protected by high tariff and non-tariff barriers.

Consider a removal of foreign and domestic protection. For the purposes of argument assume that, in expanding industries, prices received by domestic firms stay constant. The increasing-return industries will expand, and the other industries will contract. The price of labour may initially fall as the labour-intensive industries release more labour than the increasing-return industries absorb in their expansion. The increased producer surplus in the expanding, increasing-return industries raises the profitability of those in-dustries and attracts capital from abroad. In long-run equilibrium, the increased surplus must eventually find its way to remuneration of domestically immobile factors of production. One dynamic process which can be imagined is that the above-normal profits in the increasing-return industries cause labour to bid up its supply price in those industries. This process must continue until the wage rate has risen enough to eliminate all producer surplus in the non-labour-intensive industries. The labour-intensive industries without benefit of scale economies will have faced large increases in unit cost, which put them at a disadvantage abroad and at home. Large contractions in these industries are to be expected.

These general equilibrium effects of factor price changes on capital-intensive/decreasing-cost industries versus labour-intensive/constant-cost industries are extremely important. Partial equilibrium analysis working with constant factor prices would probably seriously underestimate the shift in resources into increasing-return industries, and hence the probable gains from realizing scale economies. Furthermore, the GE analysis may partially

mitigate the partial equilibrium observation that expanding export industries with little producer surplus and no domestic consumption yield few benefits to the domestic economy. The scale-economy gains might well be realized in terms of increased domestic factor prices. Thus, provided the expansion of export industries does not occur simultaneously with a deterioration in the terms of trade, the net effect is likely to be beneficial.

This simple story is not fully descriptive of the long-run adjustment process. In some industries the realization of scale economies will result in firms' cutting prices and expanding further. Second, there is the possibility that changeover costs on production lines are fixed costs which are substantially labour costs. Rises in the domestic wage will make these changeovers less profitable and encourage product rationalization within the plant. This will encourage further intersectoral shifts in resources. There are a number of additional possible general equilibrium effects which could be mentioned. The important point is that the general equilibrium repercussions of a change in protection are quite likely to be substantial. Partial equilibrium industry analysis may seriously underestimate the impact of these changes even if it adequately incorporates industry level detail such as scale economies. On the other hand, it is quite possible that partial equilibrium analysis which does incorporate the relevant industrial-organization features may give a considerably more accurate view than a neoclassical/competitive general equilibrium analysis. At this time we simply do not know.

Product differentiation and intra-industry trade

Intra-industry trade is commonly observed in most countries and at quite disaggregated commodity definitions. That is, it is observed that countries both export and import within the same commodity category. Within the conventional neoclassical model of trade this cannot happen; an industry is either an export or an import industry. Indeed it is observed that if one divides observed trade flows into intra-industry and interindustry, a great deal of trade between industrial countries, in fact, the dominant portion, is intra-industry trade.[21] For many years the economics profession largely ignored this 'fact' and proceeded as if intra-industry trade was not important. Recently, however, there have been a number of theoretical models proposed which purport to explain intra-industry trade.[22]

Most of these models use product differentiation on a world level to ex-

plain intra-industry trade. That is, countries produce commodities within a given industry definition which are not identical; they product-differentiate. Some countries produce blue cars, and other countries produce red cars. The country producing blue cars would export blue cars and import red cars. The rationale for the product differentiation is the joint presence of scale economies in production and the taste for diversity on the part of the consumers of the product. Scale economies, or more accurately fixed costs, are necessary; otherwise a particular country would not specialize in one product variety but would produce all possible varieties, provided conditions of production are the same in all countries, i.e., there is no comparative advantage between countries. The demand for variety is necessary to explain why firms would bother product-differentiating. Given that consumers are willing to pay the costs of having a wider variety of goods available, there is the incentive for firms to incur the fixed costs of providing additional product varieties.

The importance of product differentiation has been stressed by many economists since Chamberlin's early analysis, and it still plays a central role in the theory of entry barriers in the industrial-organization literature.[23] It is difficult to know how to quantify the real income gains to increased product variety in any ex ante sense. Ex post, the economist can always undertake a willingness-to-pay test, that is, can observe what consumers were willing to pay for an additional product. It is a quite different matter to predict what the willingness to pay is, though, from the observation of historical price-quantity data. One formalization, introduced by Spence (1976) and referred to as the elasticities approach, has been used a good deal in recent years and will be used in the formal model in later chapters. This is to postulate a specific function with relatively few parameters which generates all demand curves for all conceivable products. However, there is a legitimate question as to what this exactly means.

In the international trade literature it has become quite common to assume that foreign and domestic goods in the same 'commodity' category are imperfect substitutes - the now famous Armington (1969) assumption. Why are they imperfect substitutes? Is it because they are literally different goods in a consumer's eyes with well-defined characteristics which differ between the goods? Or is it that the imperfect substitutability is a proxy for a host of factors including transportation costs, marketing, service, quality, and imperfect information?[24] For the purposes of some analyses it may not

make a great deal of difference. One can imagine studying the predicted impact of a domestic tariff removal on the widget industry assuming that foreign and domestic widgets are imperfect substitutes in demand characterized by a given cross-price elasticity of demand. On the other hand, if the removal of the tariff causes a shrinking of the number of domestic product lines, with an associated welfare loss under an assumed degree of imperfect substitutability, it is quite another matter. For example, if widgets are shovels with certain well-defined physical characteristics, why is a domestically produced shovel not a perfect substitute for the foreign product of the same type? All this is by way of a warning. While most economists believe product differentiation to be important, we have relatively little knowledge on how to quantify it. In the international trade context, the assumption that foreign and domestic goods are imperfect substitutes may seem quite innocuous, but it buries a great deal of detail that may well be important in any welfare analysis.

If one accepts the significance of product differentiation, it has quite practical importance in the analysis of the cost of production. An excellent paper is that of Krugman (1980a) in this regard. For example, removal of domestic tariffs may have a negative impact on the number of domestic products in a particular category provided, and this in turn could have a negative impact on real income. It is now well known that, on balance, a unilateral tariff cut can actually lead to welfare losses because of the negative effect on product variety even if all other traditional costs of protection are positive.[25] On the other hand, a cut in all tariffs generally leads to an improvement in world product variety and hence world welfare. This may be particularly beneficial in the case of a very small country. A cut in the foreign tariff would have a negligible impact on product variety in the foreign country but might lead to a great deal of increased domestic variety. The reason is that with a larger foreign market open to domestic firms, these firms will respond by producing new products for the foreign market. But these products will be also available to domestic consumers, and this results in a improvement in domestic real income.

The other effect of trade liberalization is an increase in intra-industry trade, assuming that comparative advantage effects are relatively small. This increase occurs as a result of all countries being able to sell more of their own particular products and an expansion in the extent of product variety offered by all countries. Consequently, both imports and exports rise in the

same industry. This is widely believed to be the predominant effect of the formation of the European Common Market on intermember trade patterns.[26]

Associated with this increase in intra-industry trade is an increase in intra-industry specialization of the plant. This has been referred to before and will not be dwelt upon here. Trade liberalization means that plants in different countries, but within the same industry, can now specialize in particular products, thereby achieving greater scale economies within any given product and no decrease in the industry level of variety.

The welfare analysis of product differentiation and scale economies is quite different than a study of scale economies in homogeneous good industries. An improvement in welfare can occur even if the unit costs of production increase because firms produce a wider variety of products, but with shorter production runs on each variety. Consumers end up paying more for each product because of the higher costs; however, because they have access to a larger variety, they are better off. Thus, benefits from economies of scale and product variety trade off in a fairly straightforward way at the individual industry level. Increased benefits from greater scale economies in any single product can only be had at the expense of reduced product variety. To the extent that society puts a greater weight on product variety, the concern for achieving scale economies in the production of any single good will be mitigated.

The value of international trade is that it offers an opportunity to avoid the scale economies/product variety tradeoff. By having a larger world market, both greater scale economies and product variety can be achieved. This observation carries with it an important corollary. Anything which expands the size of the market will increase the possibilities of both increased product variety and the achievement of greater scale economies in production. The growth of post-war industrial economies has been coincident with a large increase in intra-industry trade. It is quite obvious that increased liberalization of trade may have been responsible for some of the increase in intra-industry trade, but it is also quite likely that a great deal of it can be explained by the general growth of the world economy.[27] Offsetting this, perhaps, is the observation that growth has been associated with changes in technology such that economies of scale have increased in significance.

THE INDUSTRIAL-ORGANIZATION CRITIQUE: EVIDENCE

Empirical evidence has been offered in favour of the importance of scale economies, almost all of it for Canada. Much of this material is well known, and there seems to be little value in reviewing it in detail. A recent survey by Daly (1979) covers most of the salient ground. This section treats respectively scale economies, international productivity differences, and trade studies which incorporate these. We will not attempt to summarize the empirical literature on Canadian industrial organization. Green (1980) and Caves, Porter, and Spence (1980) cover much of the relevant material. At the heart of the industrial organization critique are two points: (1) Scale economies exist in many manufacturing industries and are significant relative to market size. This means both that minimum efficient scale (MES) is large relative to market demand and that the cost disadvantage from operating below MES is substantial. (2) Plants in Canada in protected markets operate significantly below MES. Many studies document these 'facts' for Canada, and they use a variety of methods ranging from interviews to sophisticated econometrics.[28] Evidence on point (1) from Eastman and Stykolt (1967), as summarized by Gorecki, is given in Table 2. For numerous industries, a substantial portion of industry capacity operates in the inefficient, i.e. below MES, level of production. Table 3 presents the corollary evidence on the cost disadvantage suffered from operating at below MES. For example, in refrigerators, unit costs rise by 10 per cent above MES unit cost at 27 per cent of market size.

Numerous studies stress the difference between product-specific scale economies and plant scale economies. Daly and Caves have repeatedly documented that Canadian plants are more highly diversified than comparable American plants. It is very difficult to put precise numbers on this effect because of the difficulty in getting sufficiently detailed plant data to document the effect on unit cost of incurring additional fixed costs associated with producing more products within the plant. All authors stress that a more highly diversified plant necessarily implies shorter production runs on any given product. The presence of product-specific economies means that scale economies must be interpreted carefully. Most studies use an aggregate measure of output and do not control for the level of diversity within the plant. Indeed, Daly (1979) argues that for many industries the cost disadvantage at operating below MES is relatively small. He argues that plant scale alone, ignoring product-specific economies, may account for only five

TABLE 2
The efficiency of plants in sixteen Canadian manufacturing industries: circa 1959

Industry	No. of Plants of Minimum Efficient Size Compatible with the Canadian Market(1)	Actual No. of Plants	% of Industry Capacity of Efficient(2) Size
Fruit Canning	4	13	0
Vegetable Canning	24	43	50
Cement(3)	18	18	80
Container Board(3)	5	10	57
Shipping Containers(3)	28	37	72
Synthetic Detergent			
Solid Detergents	7	3	100
Liquid Detergents	49	n.a.	75
Electric Refrigerators	0.6	10	0
Electric Ranges	0.9	23	0
Wringer Washing Machines	8	14	58
Newsprint	36	39	80
Beef Packing(3)	42	47	68
Pork Packing(3)	16	45	9
Petroleum Refining(3)	7	40	0
Primary Steel	4	4	0
Rubber Tire	7	9	20

Notes:
(1) Including International where relevant.
(2) Minimum efficient size or greater.
(3) Regional industry.

Source: Gorecki (1976b, Table 2.3, p. 16). Gorecki's sources were Eastman and Stykolt (1967, various pages).

TABLE 3
An index of the percentage of the market accounted for by a plant operating at 5 and 10 percent unit cost disadvantage(1) for sixteen Canadian manufacturing industries for 1967

Industry	Minimum Efficient Plant Size as a % of Market Size	Plant Size as a Percentage of Market Size — Cost Increment (Per Cent)	
		10	5
Refrigerators and Freezers	Over 100	27.0	61.0
Integrated Steel	38.5	14.1	23.0
Portland Cement	15.2	9.6	12.0
Glass Bottles	13.9	5.0	8.3
Anti-Friction Bearings	17.0	4.3	8.5
Breweries	34.5	4.0	11.5
Solid Detergent	60.2	3.6	14.3
Bricks	3.1	2.3	2.6
Automobile Storage Batteries	21.7	2.1	6.6
Petroleum Refining	16.7	1.8	5.3
Paint and Varnish	15.9	1.4	4.6
Cotton and Synthetic Broad Woven Fabrics	5.8	1.4	2.8
Cigarettes	76.9	Less than 1%	6.5
Bakeries	2.5	Less than 1%	1.5
Sulphuric Acid	37.5	Less than 1%	1.0
Non-Rubber Shoes	1.7	Less than 1%	Less than 1%

(1) Compared with operating at minimum efficient size.

Source: Gorecki (1976b, Table 6.5, p.69). Gorecki's sources were Pratten (1971), Scherer (1973), and Silberston (1972).

percentage points of the thirty percentage points difference in labour productivity between Canada and the United States during the 1960s.

The evidence of the effect of protection on suboptimal scale is subject to varying opinion. Table 4 from Gorecki seems to confirm the conventional view. Statistical evidence is not conclusive on this point, although it is readily admitted that there are numerous problems in interpreting the data (see Bloch 1974 and Hazledine 1981, for example).

One of the major problems with most of the studies cited above is the dependence upon survivorship estimates of MES, or upon defining MES as the average size of the n largest firms and n smallest. These estimates suffer from well-known difficulties (Shepherd 1967). Engineering estimates are not widely available; where they are, they are usually much larger than survivor estimates. Recently Fuss and Gupta (1981) provided a comprehensive set of econometric estimates which are used later in this study. Table 5 is a comparison of Fuss-Gupta's results to engineering estimates for selected industries. In general, the econometric estimate of MES is much smaller than the engineering estimate; but this is also true of other sample-based estimates given (consider Table 6). While caution is called for, it may be fair to say that the importance of economies of scale may well be understated in existing studies.

Related to the concern with scale economies are the international comparisons of factor productivity in manufacturing industries which rank Canada systematically below other nations. For example, in the mid-1960s Canada was thought to be roughly 30 per cent behind the United States in output per man-hour, and this gap is believed to have narrowed to around a twenty-five percentage point difference by the late 1970s (Table 7). There are undoubtedly many factors which are relevant in explaining these differences (West 1971, Frank 1977). Many authors have stressed differences in the degree of scale economies achieved and in the degree of product diversity within the plant (West 1971; Daly 1979; Scherer et al. 1975; Caves, Porter, and Spence 1980). These differences in factor productivity inevitably show up in high real product prices or, equivalently, in low returns to immobile factors and in particular in a lower real wage in Canada. A major policy concern is how such productivity differences might be eliminated.

The two major proponents of the interaction between industrial organization and trade were Eastman and Stykolt (1967) and Wonnacott and Wonnacott (1967). The arguments put forth in these books have already been laid out.

TABLE 4
The ratio of actual plant size to efficient plant size grouped by effective tariff rate for thirteen Canadian manufacturing industries circa 1967

Level of Effective Tariff	Number of Industries	Average Value of Ratio of Actual to Efficient Plant Size
High	6	0.48
Low	7	1.12

Source: Daly (1979, Table 10, p.29). Daly's source is Paul K. Gorecki (1976b, p. 54).

TABLE 5
A comparison of the engineering and the Fuss and Gupta (1981) cost function estimates of the MES and the slope of LAC(1)

		MES as a Percentage of Industry Size		Estimates of the Slope of LAC(2)	
SIC (1960) Code	Industries	Engineering Estimates (1967)	Cost Function Estimates (1968)	Engineering Estimates at MES/3	Statistical Estimates at MES/2
1290	Bakeries	2.5	0.84	--(3)	--(4)
1450	Breweries	34.5	8.85	5.0	4.80
1530	Cigarettes	76.9	13.13	2.2	2.35
1740	Non-Rubber Shoes	1.7	0.07	1.5	0.01
2910	Steel	38.5	7.34	11.0	1.62
3370	Storage Batteries	21.7	3.32	4.6	2.46
3410	Cement	15.2	4.19	26.0	36.60
3561	Glass Bottles	13.9	6.84	11.0	4.53
3651	Petroleum Refining	16.7	1.09	4.8	1.65
3750	Paint and Varnish	15.9	1.95	4.4	5.04
3760	Soap	20.8	4.37	--(3)	--(4)

(1) The engineering estimates of MES are from Gorecki (1976b, Table 5.1, p.48). His sources are Scherer et al. (1975, Table 3.15,p.94) for the middle nine industries and Pratten (1971) for the other two industries. The engineering estimates of the slope of the LAC are from Scherer et al. (1975, Table 3.11, p.80). The comparability of industries was based on Gorecki (1976b, App.D), except that Fuss and Gupta do not think 'brick' and 'refrigerators and freezers' are comparable with any Canadian SIC industry.

(2) The slope of LAC is measured as the percentage by which average cost increases by moving to one-half or one-third of MES.

(3) Unavailable.

(4) Not computed.

Source: Fuss and Gupta (1981, Table 2, p.133)

TABLE 6
Ratio of engineering to sample-based MES

Fuss and Gupta(1) (1981)	McFetridge(2) (1973)	Jones et al.(3) (1973)	Gorecki(4) (1976b)
4.7	2.9	3.1	--(5)

Notes:

(1) Cost function estimation (11 observations).
(2) Average size of 4 largest plants (10 observations).
(3) Average size of largest plants accounting for 80% of industry output (9 observations).
(4) Survival technique estimation (6 observations).
(5) No significant relationship.

Source: Fuss and Gupta (1981, Table 3, p. 133)

TABLE 7
Output per hour in total manufacturing - United States, Canada and Japan (U.S. 1967 = 100)

	United States	Canada	Japan
1955	74.0	40.1	12.2
6	73.5	41.8	12.9
7	75.0	42.1	14.1
8	74.6	43.6	13.2
9	78.1	45.9	15.4
1960	78.8	47.5	17.7
1	80.7	50.1	20.0
2	84.5	52.7	20.9
3	90.4	54.8	22.6
4	95.2	57.2	25.6
1965	98.2	59.3	26.6
6	99.7	61.4	29.3
7	100.0	63.3	33.6
8	103.6	75.4	37.9
9	104.9	71.5	43.8
1970	104.5	72.6	49.4
1	110.3	77.8	51.1
2	115.7	81.3	54.4
3	118.8	85.0	60.9
4	112.6	86.4	61.1
1975	118.2	84.3	58.7
6	123.2	88.2	63.4
7	126.1	92.4	66.9
8	129.2	96.3	72.5

Sources: Daly (1979, Table 12, p. 37). All estimates are based on relative price and quantity data for manufactured products rather than on exchange rate adjustments. The U.S.-Canada comparison for 1974 is based on Frank (1977, Table 9, p. 66), based on Canadian price weights. U.S. annual estimates carried forward and back by indexes of output per hour in U.S. Department of Labor, Bureau of Labor Statistics, Output per Hour, Hourly Compensation and Unit Labor Costs in Manufacturing, Twelve Countries, 1950-1976 , (Washington: Mimeo, Nov. 1977) and U.S. Department of Labor News , "International Comparisons of Manufacturing Productivity and Labor Costs, Preliminary Measures for 1978", July 10, 1979. Annual estimates for Canada are carried forward and back by indexes of output per man-hour in manufacturing in Statistics Canada, Aggregate Productivity Measures, 1946-1977 , (Ottawa: 1978. p.53). These results are almost identical to those that can be obtained by updating earlier results for 1963 by E.C. West (1971).

The empirical work in both books tends to be partial equilibrium in nature, i.e. an industry-by-industry analysis of the relevant market characteristics. The famous 10.5 per cent number put forth by the Wonnacotts received relatively little emphasis in the book. Eastman and Stykolt offered no estimate of the cost of protection. The Wonnacotts tended to emphasize in their industrial studies scale economies and locational factors; Eastman and Stykolt emphasized entry barriers to domestic markets emanating from scale economies, product differentiation, and absolute cost advantages. The focus on industry studies is perhaps quite appropriate given the data and the existing research methods available at the time.

Within Canada both books quickly had a significant effect on Canadian policy discussion. The positive arguments being made clearly appealed to many observers of Canadian industry. In the international community of professional economists, however, these books did not attract the same amount of attention. International economists at the time were generally concerned with developing and applying the neoclassical model of trade. The view was probably that the general equilibrium/intersectoral implications of trade policy were the significant features to be captured in empirical work, and that scale economies or imperfect competition could not be sufficiently important to outweigh these. What was certainly not appreciated at the time was the significance of the ESW view for intersectoral allocation.

OTHER STUDIES

The trade liberalization following the formation of the European Common Market attracted a great deal of attention from economists. In particular, Balassa (1967) carried out an ex ante study which differed significantly in its predictions as to the consequences of liberalization from the predictions of the neoclassical model. As in the case of ESW, Balassa never worked with a formal model. His predictions, however, were remarkably insightful. Roughly speaking, he argued that rationalization across industries would be the major effect of the formation of a common market due to economies of scale and horizontal specialization. Exports from all countries would increase, and major real income gains would be achieved by the rationalization of production. While there might be some interindustry shifts in resources, these would be dominated by the increases in intra-industry trade. He also argued that investment would rise substantially, quite possibly due to the rational-

ization. By and large, a good number of Balassa's predictions were realized, although they might well have occurred for reasons other than a liberalization of trade among member countries.

In his ex post evaluation, Balassa (1975) takes a rough guess at the quantitative effect of scale economies. He uses an estimate of Walters (1963) who found for the United States that, in the first half of the century, a doubling of inputs in the non-agricultural sector was accompanied by an increase in output of approximately 130 per cent. Using this rule of thumb and with an estimate of the increase in intra-EEC trade, he estimates the scale economy gains to GNP in the EEC to be 0.5 per cent, assuming that scale economy gains are only realized on the increase in trade. Indeed, this may be a serious understatement, since it excludes any gains which might be realized on existing production and non-traded goods. What is interesting though, is that he estimates by conventional triangle analysis that the 'static' gains were 0.15 per cent of GNP. Thus the ratio of scale economy gains to static gains appears to be 3.33. This is much larger than the Wonnacotts' (1967) calculation. They took the static gains to free trade to be 4.5 per cent of Canadian GNP and the rationalization effect to be on the order of 6 per cent of GNP, or a scale/static gain ratio of 1.63.

Finally, a recent study by Ingram and Pearson (1980) on the economic integration of Ghana and the Ivory Coast explicitly includes scale economies. They estimate enormous gains to the formation of a customs union: 33 per cent of gross output at world prices for Ghana and 22 per cent to the Ivory Coast. Of these gains, they attribute one-fifth to scale economy effects. It is interesting that in this study, the total gains are quite large, indeed the largest we know of, but the scale economy portion constitutes a 'modest' 20 per cent of the total gain.

These are the only known empirical studies of trade liberalization we know of which incorporate scale economies in a significant way. Imperfect competition plays no explicit role in any of these studies, although it may well be implicit in the assumptions made.

CONCLUSION

In conclusion there are four basic points:

1 There are good theoretical reasons to expect that the inclusion of scale

economies and imperfect competition will significantly alter cost-of-protection estimates. The cost of protection or benefits to economic integration are likely to be much larger than estimates derived using conventional competitive-constant-cost neoclassical models.

2 The existing 'conventional' estimates of the cost of protection, for both Canada and other countries, using either partial equilibrium or general equilibrium methods are quite small. The orders of magnitude range from 0.1 per cent to 4 per cent of GNP.

3 Eastman and Stykolt (1967) and the Wonnacotts (1967) argued persuasively that the costs of protection to Canada, a small open economy, are quite 'large' and will be significantly understated by analysis which excludes consideration of scale economies and specialization within the plant. The Canadian evidence on industry structure and productivity is supportive of the ESW view; it does not, however, provide any direct evidence on the 'true' cost of protection, or on what would happen in the event that foreign or domestic protection were removed.

4 There is relatively little evidence from other countries on the interaction between 'rationalization' and protection. What evidence does exist supports the view that rationalization is important but offers little guidance as to its quantitative importance.

3
Trade and industrial policy

Introduction

The basic policy issues emanating from the industrial-organization view of trade are not greatly different from the traditional trade policy issues; both relate to achieving the greatest possible benefit for the national state from economic interaction with other nations. The role of the market system is not always spelled out clearly in these discussions. Even economists of the extreme free market school allow that if one's trading partners are not free market economies in the sense that there is either direct intervention or indirect intervention in the form of taxes, subsidies, and tariffs, then the national interest dictates that government intervene in some way. It is always important, though, to point out the extreme harm that can be done to both world and domestic interests by beggar-my-neighbour policies. Each country on its own attempts to improve its position at the expense of its trading partners. If each country attempts to do this, then all end up worse off than they would have been without such attempts. This is what is known in economics as a 'free rider' problem.[1]

In mixed public-private economies it is in principle impossible to distinguish between those policies which are 'trade policies' and those which are not. Any economic policy will have consequences for the nation's balance and structure of trade. These include tax and expenditure policies, defence and foreign aid, population, health, and education policies, as well as traditional monetary and fiscal policies. Nevertheless, it is common to speak of a collection of policies as 'trade policies.' These include (1) the imposition of tariffs, taxes, and subsidies, and non-tariff barriers to trade such as quotas

and voluntary export restraints; (2) bilateral and multilateral negotiations with other countries for the purpose of negotiating simultaneous reductions in foreign and domestic tariff and non-tariff barriers - an extreme outcome of such a process would be world free trade; and (3) the formation of limited free trade areas or customs unions, such as the possibility of a North American customs union or free trade area. There are many variations on, and combinations of, these various policies in the traditional policy 'menu.'[2] It is not possible to review all the traditional arguments for and against each of these policies. It is useful, however, to review the arguments which are peculiar to the industrial organization critique in each of these cases.

In the discussion of raising or lowering a domestic tariff one must make some assumption about the response of other nations. For example, to assume a nation can raise a domestic tariff without expecting retaliation by foreigners is naive and not to be taken seriously in any policy debate. Analytically, this possibility leads to the discussion of an 'optimal tariff'; this is the attempt to exploit a variable terms-of-trade with the rest of the world. Of course, if all nations raise tariffs simultaneously, the end result is a welfare-inferior, world-tariff-ridden equilibrium. The decision to impose tariffs unilaterally may well be the optimal response to the decision by foreigners to raise their own tariffs if all attempts at negotiating reductions fail. In general, it is never desirable, assuming the possibility of retaliation, to increase domestic tariffs starting from a position of free trade. This has not been the starting point of most policy discussion, though. A common policy issue is the possibility of removing domestic tariffs and other trade barriers unilaterally. Two points are commonly made. First, in the absence of terms-of-trade effects, the net benefit is positive, based on the conventional cost-of-protection argument for a small country. Second, the benefits from industry rationalization are likely to be large and positive. Thus, even if there are terms-of-trade effects, these may be swamped by the rationalization effects, and unilateral free trade will prove desirable.

In the discussion of multilateral free trade the same points come up. Again, the rationalization arguments weigh heavily in favour. This view has been supported recently by both the Economic Council of Canada (1975) and the Senate Report (1982). We return to these arguments below.

The last policy option is that of limited free trade arrangements or of a customs union with a select list of partners. The European Common Market is the best known of such arrangements. A principal benefit of a customs union

is that it secures a large market for the industries of small countries. This feature of common market arrangements has been emphasized repeatedly by such authors as Balassa (1966) and Corden (1971). To the extent that significant economies of scale are present, this benefit will be important. In Canada the most frequently discussed common market is either with the United States or with all of North America (Wonnacott and Wonnacott 1982, Senate Committee on Foreign Affairs 1982). The proposal of free trade with the United States is often viewed as tantamount to complete economic union; this is seen as removing independence in national economic policy rather than as the more limited purpose of the bilateral removal of trade barriers.

A final trade policy issue is selectively cutting the tariff on one or a few industries, leaving in place the protection on all other domestic industries. The interest in such a policy stems from a more limited policy perspective which imagines making marginal changes in the tariff structure with possible improvements in the overall tariff structure and an eye toward industry employment or other objectives. If the policy situation is one where the level of protection in the rest of the world remains fixed, then this is the appropriate policy question; one is looking for a best response toward external policies.

For economists, one reason for examining limited tariff cuts is primarily analytical - the distinction between partial and general equilibrium analysis. It is often argued that a policy such as a selective tariff cut is the sine qua non of partial equilibrium analysis. By doing an appropriate general equilibrium analysis it is possible to check whether partial equilibrium analysis will actually lead one too far astray. Since partial equilibrium analysis is the predominant empirical method, the issue is of considerable importance. In some ways this is the reason for distinguishing effective from nominal tariff protection (Corden 1971). For example, removing the tariff on an industry such as steel may have some predictable impact effects on the price and output of the steel industry, together with some rationalization effects. But what about those effects beyond the impact? Other industries and consumers using steel will substitute away from other goods, and this will shift the demand curve in steel. Furthermore, these effects may actually feed back in the form of changes in the prices of products and factors used in the steel industry; this will shift supply conditions in the steel industry, and so forth. For partial equilibrium analysis to be correct, all these second-round or feedback effects must be small relative to the impact effect. It is an empir-

ical matter whether such effects are small.

What is the role of cost-of-protection estimates in discussions of these policies? Ideally, if one had an ideal and complete general equilibrium model of the world, each policy alternative could be investigated under an assumed set of hypotheses as to the actions of foreign and domestic policymakers. Thus, taking the behaviour of economic agents as given, we can predict the employment and real income consequences of alternative policies. Cost-of-protection estimates attempt to get at the real income consequences of some of these hypothetical policy experiments.

For example, if considering a unilateral reduction in domestic tariffs, what would be the impact on Canadian real income if there were no reaction by foreigners? On the other hand, if the outcome of negotiations with other nations could lead to a removal of all foreign trade barriers, provided Canadian trade barriers were reduced, what would be the real income consequences in this case? These are both questions which the GET model will attempt to answer in chapter 6. The possibilities present in a discussion of customs union formation are quite complex, involving, in addition to rationalization gains, those gains resulting from trade-creation and trade-diversion effects.[3] To estimate these in a general equilibrium framework is quite a complex matter and will not be attempted in this study. However, given the extent that Canada's trade is with the United States, it is likely that the free trade scenario approximates the U.S.-Canada free trade situation in many ways as far as the Canadian economy is concerned.

The cost-of-protection estimates which come out of these types of studies, as emphasized in chapter 2, are only meant to be approximate. They offer order-of-magnitude estimates as to the numbers for the actual policy experiment. As such, they should form an important input into the evaluation of trade policies, albeit not the only input. Other considerations, such as predicted changes in external circumstances not reflected in the calculations as well as political considerations, weigh heavily, as they should, in these matters. These policy choices may reflect tradeoffs between economic objectives and non-economic objectives such as cultural and political independence.

The economist's input into these discussions is often accused of being excessively narrow both in focus and analysis. Nevertheless, the basic issue at stake is an economic issue: the methods by which a nation creates wealth or goods and services to be enjoyed by its citizens and governments. If the

means of wealth creation are severely hampered, the pursuit of non-economic objectives will be constrained accordingly. It matters a great deal in the discussion of Canadian commerical policy whether the quotas on textiles cost the Canadian public $3 million or $300 million a year. These are wasted resources which could be used for other purposes; even if it is decided by decision-makers that the benefits are worth the costs, the costs themselves should be made perfectly clear to all.

Good policy and bad numbers are an extremely unlikely combination. Indeed, what is amazing in the history of the Canadian policy debate on these matters is how little in the way of resources have been devoted to putting together such numbers, say, relative to the resources devoted to building short-term macroeconomic forecasting models. For longer-run resource allocation issues, the importance of the basic numbers cannot be understated; what is at stake in these policy issues is of enormous importance particularly when such broad options as free trade versus across-the-board protection are being contemplated.

INDUSTRIAL STRATEGY

The term 'industrial strategy' means many different things to different people, judging by the recent torrent of writing in the press and quasi-professional journals. All definitions of industrial planning are vaguely related to the theme that government intervention of one form or another in a nation's manufacturing sector is desirable or necessary. Furthermore, the argument is often made that there is something unique about events at this point in history which makes intervention necessary when previously it was not called for.[4]

One can identify at least three basic events of the 1970s which have generated the perceived need for an industrial strategy. First were the oil shocks of the 1970s, which significantly raised the price of a crucial material input into almost all production processes. These increases in turn are said to have caused de-industrialization in countries such as Canada with a significant oil-producing sector. The shift in the terms of trade against manufactured goods and in favour of oil caused economies with oil reserves to shift their resources out of manufacturing and into the oil-producing sector.[5] This was seen to cause the loss of a large number of jobs in the traditional sectors. The problem was exacerbated in that, as of 1982, the shift in the terms of

trade may have only been temporary while the decline in the manufacturing sector was permanent because other nations gained world market share in the interim. Industrial strategy may be defined as a broad set of policies which attempt to preserve and create jobs in the face of de-industrialization forces.

The second factor which figures prominently in any discussion of industrial strategy is the success of Japan. The argument is that 'whatever they are doing, they must be doing it right!' Japan overturned one traditional industry after another. On a cost-competitive basis the Japanese systematically beat out the Americans in textiles, nylons, autos, television sets, and consumer electronics, and they have now turned to the new growth industries of robotics, computers, and satellites. There are two interesting perceived features of the Japanese case. First, their success occurred in spite of 'traditional' comparative advantage - why should Japan have a comparative advantage in autos over the United States? Second, the Japanese economic system seems to be highly non-market-directed. The government and large firms appear to follow a highly co-ordinated and deliberate policy of building markets, first domestic and then foreign - hardly Adam Smith's invisible hand. For many, the Japanese model is direct proof of the benefits resulting from a national industrial strategy, and indeed they argue that Canadian industry will virtually disappear if other nations practise these policies and policymakers in Canada do not do likewise.

The third factor which provided impetus to the industrial strategy concept was the rise of the so-called 'New Protectionism' following the Kennedy and Tokyo Rounds of GATT under which tariffs on manufactured goods of the industrialized countries had been significantly lowered. This removal of traditional protection has led to the proliferation of alternative import substitution policies of the non-tariff sort. Quotas, voluntary export restraints, customs valuation procedures, and so on have all been used to a much greater degree to prevent the loss of domestic markets to imports. The 'New Protectionism' also refers to export promotion policies which have become standard in many countries. These policies all involve subsidizing or aiding exports in some manner. Prominent examples include the American Domestic Import Sales Companies (DISCs) and the Canadian Export Development Corporation.[6]

Export promotion of this sort is contrary to the GATT conventions and in many countries justifies policies intended to counteract 'unfair competition' from subsidized exports. In the United States countervailing duties can be

levied on imports when it is determined that a foreign subsidy is involved.[7] The combined effect of the subsidy and retaliation means that the overall level of protection has been raised significantly.

The proponents of industrial strategy include those who argue that we should subsidize domestic export industries because foreigners subsidize theirs. They also quite naturally argue that we should protect our domestic markets as a practical countermeasure. Industrial strategy, then, is part of a set of national policies which are necessary in a world of unfortunate, but rising, protectionism.

These three 'facts' of the 1970s and 1980s are basic motivations for an industrial strategy. In each case, it is noteworthy that the open-economy aspect of the problem is crucial - the presence of foreign competition for the domestic manufacturing sector is the perceived 'enemy.' It is also true though that industrial strategies are outward-looking in that they are directed toward world markets. Scale economies seem to be the rationale. For a particular industry to be successful, it must be cost competitive and hence must capture a significant share of the world market (Abernathy et al. 1981). Thus, scale economies have been elevated to significance even for countries such as the United States and Japan with large domestic markets.

The details of industrial strategies are varied. They run the gamut from factor subsidies, output subsidies, and export subsidies to merger and rationalization, entry prohibition policies, and the support of research and development. Policies differ in their degree of selectivity, ranging from the targeting of sectors to the targeting of particular firms within industries. This of course raises the thorny problem of how to go about picking winners and losers. In addition, there is the inevitable political difficulty of sorting out a policy which is part of an industrial strategy from one which merely props up a failing industry. It is simply too easy to argue that an industry failing today will be a dynamic world-competitive industry somewhere down the road. The trouble with this old infant-industry argument is that these infants often never grow up.

The analytical and empirical terms of this study do not allow us to consider all aspects of an industrial strategy, or industrial policies more generally. Using the GET model, however, one can for the first time make some new policy evaluations because of its unique characteristics. These include explicitly defining the firm as a unit within the industry and describing the firm's technological characteristics and allowing the degree of

competition within an industry to vary, so that the consequences of monopolization, for example, can be explored. Policies which affect industrial structure within a given framework of technology and tastes can be investigated. This gives the model a substantial advantage for policy purposes over input-output models or any competitive general equilibrium model. Unfortunately, the model is not dynamic, so that all statements must be understood to refer to the comparisons of long-run equilibrium. This is, of course, a serious shortcoming of all existing general equilibrium policy models. In doing these policy experiments, the level of protection in foreign markets can be held constant, or varied, depending upon the objective. In the practical evaluation of any policy it must be remembered that some foreign retaliation is likely.

INDUSTRIAL POLICY EXPERIMENTS

We now turn to an explicit identification of the industrial policies considered in chapter 6 and some discussion of their prominent features.

Forced rationalization policies

These can take the form of barring entry in the face of market growth, forcing the exit of firms from an industry, or specific measures designed to encourage merger on either a vertical or horizontal basis. The intent of such policies is to change the industrial structure of particular industries or of industry in general. The basic idea is to 'rationalize' by having firms achieve greater scale economies. From a policy perspective it relates in particular to the role of combines policy - the way policy is directed towards monopolization, merger, and the bigness in general of business. It also relates to public enterprise in the form of crown corporations; large public firms could be viewed as one way to achieve scale without the obvious abuses of monopoly. There are numerous practical legal difficulties with such policies which occur due to the foreign ownership of firms and the potential conflict with domestic regional economic policy.[8] These types of policies can be viewed as a go-it-alone (GIA) strategy such as Wonnacott (1975b) discussed in comparison with a trade liberalization strategy. The GIA policy has never been well articulated. Wonnacott (1975b) in his discussion raises a number of objections. Two of the more significant are that the decision as to

which firms, products, and industries are to rationalize under GIA is a matter of government policy, while under a free trade arrangement it is a market decision. There is a presumption that the market is more likely to choose correctly than government bureaucrats. Second, Wonnacott makes the point that a true GIA is presumed to be independent of a trade liberalization; thus, the example of the Canada-U.S. auto pact is not a true GIA but in fact an example of selective trade liberalization. Attempts to rationalize an industry through government intervention of some form or another may be doomed to failure unless a simultaneous reduction in trade barriers occurs.

The GIA should not be dismissed too readily, at least until more evidence is brought to bear. In an economy in which scale economies and imperfect competition are present, there is no doubt that the resource allocation which exists is not 'optimal,' even in a constrained world where all trade barriers are taken as exogenously given. The difficulty is in quantifying the inefficiencies or identifying those policies which will lead to improvements. This is no easy task. Contemporary economic theory has very little to say about what the likely inefficiencies are. It is obvious that they will depend upon the nature of competition in each industry. The advantage of the free trade arrangement is that the benefits will accrue independent of industrial conduct in the protected regime. Furthermore, to the extent that competition is increased through free trade, there is an additional benefit in that the losses due to monopolization will diminish. To repeat, the benefits from GIA could be large or small - there is at present little way of knowing. Future research is called for in this area. Strictly speaking, GIA includes a host of industrial policies other than cartelization. However, since they are not specifically directed at rationalization, they are classified separately in what follows as other types of industrial policies. Adherents to the industrial strategy view would probably include direct rationalization proposals in their policy menu.

In the GET model it is possible to simulate some types of rationalization policies in a very direct way. Specifically, it is possible to consider fixing the number of plants in an industry and to observe the effect this has on the long-run equilibrium. In this way it is possible to check the benefits of policies which restrict entry or force merger. GET can also check the effect of simultaneously effecting a merger and cutting prices in the industry. The model does not detail how these changes are brought about in any institutional context - an important limitation. In its present form it does also not

reflect industrial structure in sufficient detail to consider policies which impinge on some firms in the industry but not on others. In principle it is possible to so so, but that would require a model much larger than GET and a much more detailed data base. Nevertheless, even with these limitations it is possible to conduct general equilibrium policy simulations on some rationalization proposals - a task hitherto deemed impossible.

Selective factor subsidization

This is a fairly common sort of subsidy policy proposed on an industry basis. The policy takes the form of offering an ad valorem or fixed subsidy per unit of factor employed. The intent of these policies is often to encourage the use of one factor input. They can, however, be used as tools designed to stimulate one industry directly by offering it a cost advantage over foreign competitors. This type of policy is often proposed by adherents of an industrial strategy. The factors chosen to be subsidized are either labour, since it constitutes the most significant portion of costs and has 'desirable' employment effects, or capital. The latter is also of quite practical importance since many export-subsidy programs are essentially capital-subsidy programs through favourable financing arrangements offered to the export firms.

In a conventional neoclassical analysis the effect of factor subsidies is reasonably straightforward - the primary effect at the level of the firm is the factor substitution effect. For example, subsidizing capital encourages each firm to substitute away from other inputs toward capital. In the policy simulations of chapter 6 there is another significant effect at work which is not present in the competitive neoclassical model but which is important to keep in mind. The model is one in which there are economies of scale due to the presence of fixed costs. Suppose, for simplicity, that all fixed costs are capital and all variable costs are labour. By subsidizing capital expenditures, fixed costs are lowered. There will be no substitution effect at the level of the individual firm, or equivalently no adjustment at the 'intensive margin.' Lowering the fixed costs means that the industry which was initially in a zero profit position will now be in a positive profit position. These profits will encourage entry until the profits have been dissipated and the market clears. This excludes any general equilibrium effects.

To consider an extreme case, suppose all firms face constant-elasticity perceived-demand curves; then, using Lerner's pricing rule, markup on

variable cost will not change in response to the capital subsidy. Furthermore, since marginal costs do not depend upon the cost of capital services, price will not change in response to the capital subsidy. Because price does not change, quantity demanded does not change. Entry, however, occurs in response to the subsidy, and the same industry output is sold with more firms, but with each firm producing less. The major impact of the subsidy is entry into the industry, which exacerbates the Chamberlinian excess-capacity problem. The welfare cost of this entry is measured by the increase in real average cost multiplied by industry output.

On the other hand, subsidizing variable costs such as labour has quite different effects. Marginal cost is lowered, and hence so is price. Industry output expands, and thus average cost is lowered. This direct efficiency effect is positive and could conceivably outweigh other indirect efficiency losses caused by the subsidy.

Other significant differences occur in these policies when the assumption of zero profits is dropped. Suppose the industry is oligopolistic, so that the number of firms does not change in response to subsidies. If capital is subsidized, then fixed costs are lowered, profits increase, and virtually no other industry effect takes place; price and output do not change.[9] Curiously enough, the social loss from such a policy could actually be less than if the rent were dissipated by entry of firms. If the variable costs of these firms are subsidized, profits will increase, but the firms will also be encouraged to cut price and increase output. If this were the case, then the policy could conceivably yield some benefits, particularly in a second-best world.

There is an important qualification to the above argument. In product-differentiated industries, the subsidization of fixed costs leading to increased numbers of firms means that there may well be increased product diversity available. This could lead to welfare gains even though the average cost of each product sold will have increased.

These conclusions may strike one as a bit odd since much of the discussion surrounding industrial strategy suggests that research and development expenditures ought to be subsidized. But these are by nature fixed costs - independent of the level of output subsequently produced - and hence subsidization is likely to lead to the inefficiencies cited above. R & D is rather special, so it is perhaps inappropriate to draw the analogy, but certainly the same arguments are made with respect to other large capital expenditures, such as plant costs.

A case for subsidizing fixed costs can be made if competition is thought to be quite different than the free entry-Lerner pricing model of competition. The argument is too elaborate to spell out here; it is based on the analysis of Gilbert and Harris (1981 and 1983). Their view of competition is a particularly aggressive one; firms price as close as possible to cost to pre-empt competitors and in turn are forced to price this way by the aggressive behaviour of their competitors. It is a very non-collusive view of oligopoly and one which, they argue, is relevant in growing markets with large irreversible commitments in sunk capital and in which firms explicitly follow foresighted dynamic strategies. In such a world, the distinction between fixed and variable costs loses much of its significance. Total average cost is what matters because this is where price is driven down to in the 'long run'. Subsidizing capital does not necessarily lead to an adverse entry effect in their model.

In such a world, subsidization of fixed costs imparts an advantage to the subsidized firm; indeed, the larger the fixed costs the more significant the subsidization. As is usually the case, these fixed costs are sunk costs, and uncertainty is present as to the ultimate returns. In a capital market of risk-averse investors, this puts industries with large, fixed, startup costs at a disadvantage; they will find their cost of capital higher than in other industries. In such industries, subsidization is likely to be a more effective tool.

The GET model utilizes the free entry/Lerner pricing view of competition. It does not use a dynamic model of competition as just discussed. This should be kept in mind when discussion of various subsidy policies comes up.

Export and output subsidies

An alternative to subsidizing factors in an industry is to subsidize output directly. In the theoretical trade literature on distortions this is a popular alternative to protection (Corden 1974). Thus, the firm is given a subsidy either per unit output or per dollar output. In a general equilibrium framework this has the effect of raising prices of factors used intensively in the industry. In the traditional model with constant costs, factor prices must adjust so that unit cost equals the price inclusive of subsidy. Unlike factor subsidies there is no direct incentive to substitute one factor for another, although the general equilibrium effects may induce such a substitution. In

the GET model, because of the presence of scale economies and imperfect competition, the process by which subsidies affect equilibrium is again slightly different. Consider an ad valorem subsidy applied per dollar of output. With non-competitive pricing this affects the markup the firm sets. The subsidy, however, is not fully passed on to the consumer. Comparing prices with and without the subsidy shows that as the subsidy increases the price facing the consumer of the firm's product falls. In a general equilibrium framework, of course, the factor prices can adjust as well as the final price received by producers (net of subsidy). The imposition of the subsidy at initial unit cost causes the consumer price to fall and profits to rise. The fall in the price increases the demand facing each existing firm, and the positive profits induce entry.

The overall effect of the subsidy is not unlike the effect in the conventional model. However, the entry effect again introduces an additional consideration. With a fixed, constant-elasticity perceived-demand curve, the price received by producers inclusive of the subsidy rises by a fixed amount related to the subsidy and variable unit cost. In a zero-profit equilibrium, average cost must rise by the same amount as the producer's price rises. This rise in average cost, of course, means that the subsidy induces an efficiency loss with respect to scale economies. This view is in marked contrast to some arguments which propose subsidies as a means of getting firms to achieve efficiency in scale economies. The crucial effect is that of entry in response to positive profits. If entry could be prohibited, the increased demand forthcoming as a result of the subsidy means that an improvement in scale economies would result. As in the discussion of factor subsidies, it is very important to distinguish those cases in which subsidies are accompanied by additional policies preventing entry and markets in which entry barriers are significant.

The subsidy discussed above is general in that it pertains to both domestic and foreign consumers. If the industry exports, there will be a welfare loss in the form of subsidies offered to foreign consumers paid for by taxing domestic residents.

A more selective subsidy policy is one which applies only to export demand, namely, export subsidies. In the absence of any foreign retaliation it is seen as a policy directly aimed at promoting export-oriented industries. If there is a genuine 'infant industry,' an export subsidy might well be the optimal policy tool to use in these circumstances, although in the infant indus-

try case the subsidy is not intended to be permanent. An export subsidy might also be used in an oligopolistic situation in which it imparts an advantage to the domestic firm which helps it to achieve world market share.[10] In both cases the subsidy is a means of extracting rents, present or future, from foreigners. In a general equilibrium framework, the second-best 'theorem' may be a source of benefit to subsidizing exports, even if potential rents do not exist in the export industry.

Most popular arguments for subsidizing exports implicitly make some type of dynamic argument. Subsidies are not intended to be permanent but arise from the possibility of getting long-term benefits at some current cost to the economy. In a static long-run model such as GET, it is not possible to evaluate subsidy policies based on such an explicit, intertemporal tradeoff. It is only possible to consider subsidies which are believed to be permanent. With this restriction, however, it is possible to examine quantitatively this popular form of industrial policy.[11]

Domestic protection of industry

The final industrial policy considered is raising the level of protection on selected domestic industries. This is commonly viewed as a popular alternative to subsidization in infant industry arguments. In the discussion of Japanese industrial policy for example, the 'moving band' of protection is seen as an important mechanism by which industries, one at a time, were given virtually the entire domestic market in order to establish themselves before attempting to capture a share of the world market. In 1982 the increase in non-tariff protection was dramatic. On analytical grounds it is probably useful to separate protection arising as an optimal response to the increase in protection abroad from selective protection designed to encourage industry on some type of infant industry argument. Both could be called 'industrial policy,' but the perceived need for policy comes from quite different sources. In GET, selective protection policies in their tariff equivalent form are considered in chapter 6. In each case the level of protection on a particular industry is raised, holding constant other domestic policy variables and the level of foreign protection. It should not be surprising that in particular cases this type of import-substitution policy will prove beneficial. Extreme caution is called for in interpreting these results. Taking the foreign response as exogenous is not a realistic assumption in many situations.

THE COST OF FOREIGN RETALIATION

Throughout this chapter we have emphasized that examining industrial or trade policy without considering the response of foreigners may be quite misleading as to the outcome of a policy equilibrium process. In order to isolate the quantitative effect such a response could have, the cost of foreign protection is estimated using GET. Specifically, we ask the model what the real income consequences for Canada would be of a 50 per cent increase in the level of protection in the rest of the world. The results of this hypothetical question are probably as important as the results of the studies addressing the benefits of trade liberalization or selective industrial policies. In the current policy environment, protection as opposed to trade liberalization is more commonly discussed as the relevant option.

The cost of raising the foreign tariff is not the same as the benefit to lowering it by an equal amount except in the simplest possible models. A great advantage of the applied general equilibrium approach is that an answer can be given to this question. With scale economies, even at the partial equilibrium level, there is an assymetry in the problem. Only if the average cost curve is linearly declining will a 10 per cent increase in output yield the same cost decrease on the initial output as a 10 per cent decrease in output yields in cost increases. This issue is examined within the policy simulation model GET in chapter 5.

4
A general equilibrium approach to trade and industrial organization

In this chapter the basic analytical framework used in the subsequent empirical work is laid out. In particular, a description, both verbal and mathematical, is given of the large-scale simulation model, GET. As in the rest of the book, emphasis is placed on the interaction between resource allocation issues in a small open economy and the industrial-organization features of the economy. Before getting into the details of the structure of the model, a basic discussion of methodological questions is given.

METHODOLOGICAL ISSUES

To the seasoned empirical economist methodological discussion may seem all too familiar, and possibly not worth repeating. The interaction between industrial organization and real trade issues, though, presents some issues of empirical research which are fairly novel. It is worth emphasizing some of them. The basic objective of the research is to make statements about the long-run impact of changes in policy variables on trade flows, prices, factor productivity, industry structure, and consumer welfare for the Canadian economy in some time frame identified as the 'long run.' The predictions are to take the form of quantitative statements about observable and measurable variables. The statements are both positive, in that they predict what is 'likely' to occur under a given set of hypotheses, and normative, in that they implicitly use certain criteria by which policies are judged.

Empirical analysis of this sort, as indicated in previous chapters, takes many forms. Roughly, one can characterize it in three categories: industry analysis using descriptive and statistical methods, econometric large-scale ana-

lysis, and empirical general equilibrium simulation models. There is certainly no single correct method. Each has its strengths and weaknesses. Industry analysis focuses on the industry as the unit of study; it may or may not be explicitly dynamic in that it attempts to make predictions about the movement of economic variables in real calendar time (as opposed to the economist's hypothetical short and long runs); it usually is not. The great virtue of industry analysis is that it can work with extremely disaggregated data and can incorporate a wealth of detail on the structure of the industry in question. Furthermore, in an international context it can make comparisons between similar industries in different countries. The recent monograph by Caves, Porter, and Spence (1980) is an excellent example of this type of work on the Canadian economy. The difficulty with this method is that it tells one relatively little about the economy-wide implications of policy changes or other exogenous shocks with wide impacts.

Large-scale econometric models are the mainstay of macroeconomic forecasters. They usually are explicitly dynamic, are geared for a very short time horizon, and contain very little industry detail. For the purposes of both trade and industrial organization, these models are of little use to economists. The applied general equilibrium models attempt to fill in a large gap. They are explicitly devoted to long-run issues of resource allocation and incorporate the adjustment mechanisms which economists believe play an important role in intersectoral adjustment - the changing structure of relative prices.

Because changing relative prices is the main mechanism by which long-run changes in trade patterns occur, GE models have been widely used by those studying international trade. From the early work of Evans (1972) on the Australian economy up to the recent large-scale models of Deardorff and Stern (1981), Brown and Whalley (1980), and others, such studies have all pursued this approach. It is important to emphasize that these models are basically predictive as opposed to descriptive methods of research. In this they have much in common with econometric forecasting models. Their purpose is to predict how policy changes will affect resource allocation conditional on a set of hypotheses regarding the structure of the economy.

In order to describe the economy it is necessary to make statements about consumer preferences, factor supplies, and the structure of industry. These hypotheses include explicit behavioural hypotheses as to how economic actors behave. In the applied general equilibrium literature, it has become

commonplace to use as much a priori knowledge as seems sensible in describing an economy. Much of this knowledge takes the form of statistical estimates of key parameter values.

As in much economic analysis the GE models lack explicit dynamics. The predictions and time frame of these models do not correspond exactly to any real calendar time - they represent the hypothetical long run of textbook analysis. The long run is a period of time defined as one long enough that all supposed adjustment postulated in the description of the economy is allowed to take place.

It is at this point that applied GE analysis takes a great methodological leap. It assumes that a given historical data set for some period, usually one year, corresponds to one of these long runs. The model is checked for consistency by requiring that it produce as a predicted equilibrium this particular historical data set - referred to as the 'benchmark' equilibrium.

Once the model has been calibrated to do this, hypothetical counterfactual experiments are conducted. These counterfactuals take the form of asking questions of what the long-run equilibrium would have been in the same time period and with the same structure if a different set of exogenous variables had been in place. This is the method of comparative statics well known to students of elementary economics.

In examining a question like the costs of protection, one must be careful that the correct interpretation is given to comparative static statements. If a model predicts that the cost of protection in the mid-1970s was $4 billion, it does not carry with it the implication that if, starting in the mid-1970s, protection had been removed the economy would now be $4 billion better off. Nevertheless, it is possible to make a conditional prediction. If one is willing to assume that over some period of time the economy has a relatively stable structure, a counterfactual experiment based on a historical data set may imply that if the analysis could be conducted on a contemporaneous or future data set, similar results could be expected to emerge. Such is the nature of applied work in economics.

How does the incorporation of industrial-organization features affect this type of methodological framework? Factors such as scale economies and imperfect competition are not features which have played any role in existing applied general equilibrium models. In principle, it would seem straightforward enough to include them and hence produce an essentially richer model in closer conformity with reality. However, there are two major hurdles to be

overcome.

The first of these is simply data availability. The relevant industrial-organization details may not be available on an economy-wide basis. This is a common problem in competitive GE analysis which is usually dealt with by assuming that some parameter value estimated for one industry is widely applicable. One can do this, but the interpretation of the results must be appropriately qualified. For example, in the industrial-organization approach, scale economy estimates are necessary; these are usually available only on a limited basis. Furthermore, as with any applied economic analysis, it is inevitable that the investigator will have to aggregate. Aggregation can often be of great benefit to analysis because it allows the investigator to bury a great amount of detail that he is not really interested in. Where would macro-economics be without aggregation? Indeed, often the whole point is to make statements about statistical aggregates. When dealing with structural features of industries, however, it is common for researchers to go to great pains to use the most disaggregated data set possible. Unfortunately, in applied general equilibrium analysis this is simply impossible; the size and complexity of the model would be far too great to be useful.

In the GET model there exist theoretical entities such as firms and industries which have well-defined theoretical meanings. In order to give them empirical content, certain aggregates of economic data are identified with the parameters and choice variables defining these theoretical concepts. Take one example which is extremely important within GET. A firm is described by, among other things, its average cost curve and an industry identification. To construct these empirically, we start with estimates of cost curves for plants at a much lower level of aggregation.[1] A 'model-relevant' firm is constructed by assigning certain subclasses of data to a model-relevant class and then aggregating the firms' cost functions within these subclasses into a single aggregate cost function. In the neoclassical literature, it is possible to construct consistent aggregates, in which case the aggregate has the same theoretical significance as the underlying subaggregates (Blackorby, Primont, and Russell 1978). With decreasing costs, however, consistent aggregation is impossible, so that the relevant question becomes what type of bias is introduced by the aggregation process.

Unfortunately, no work has been done on the question of aggregation with scale economies and imperfect competition. But the answer seems reasonably clear. The point can be made simply with an example. Consider an in-

dustry consisting of two firms, A and B, each initially producing one unit of output. The cost function of firm A is $TC(x_a) = x_a$ and the cost function of firm B is $TC(x_b) = 2x_b - cx_b^2$, where x_a is the output of firm A and x_b is the output of firm B. Now what would be the total cost if each firm increased its output by 10 per cent to 1.1? Simple calculations show the increase in total cost to be 0.3 - 0.21c. Now suppose an aggregate cost function were constructed by taking weighted averages of the slope and intercept terms. This aggregate cost function would be $TC(X) = 1.5X - 0.5c\,X^2$, where $X = x_a + x_b$. Calculating the increase of total cost using the aggregate cost function gives an answer of 0.3 - 0.42c. Thus, the aggregate cost function overstates the cost increase by an amount 0.21c; alternatively, cost savings are understated. The bias then in averaging across decreasing-cost industries is a tendency to understate the extent of true cost savings due to scale economies.[2] Unfortunately, while the qualitative effect seems clear, there are no quantitative estimates of the aggregation bias. Clearly there is a need for a great deal of research here - see Dixon (1978) for a start.

A second type of aggregation bias peculiar to the models used in this book derives from the aggregation across decision units which are non-competitive. Thus, our model firm is a single decision-maker; the empirical counterpart, though, is many firms each acting independently. What type of bias might be introduced here? The answer depends upon the exact model of behaviour postulated for the non-competitive actors. Most of the models contained in GET use in part a type of Chamberlin-Cournot pricing hypothesis. The pricing rule of the individual firm depends upon the perceived elasticity of the firm's own demand curve. If aggregation were to change this elasticity, the markup of the aggregate could differ from the markup of the underlying micro units. In GET the elasticities of perceived demand curves come from the elasticities of the model-relevant demand categories. This undoubtedly understates the absolute value of the true elasticity of the perceived-demand curve except in one special circumstance - the case of symmetric product differentiation. Consequently, markups are likely to be too high in the aggregated firms relative to the true micro markups. Again, we do not have much knowledge as to the quantitative significance of this bias.

The second major empirical difficulty which the industrial-organization feature of GET raises relates to the distinction between short-run and long-run equilibrium. In the conventional GE models there is no distinction be-

tween short and long run, and the benchmark equilibrium is thought of as a long-run equilibrium. In a model with scale economies, an attempt to force a given annual data set to reproduce a zero-profit, long-run equilibrium, while not impossible, produces nonsensical results. The major problem relates to imputing the fixed factor requirements which constitute the fixed costs of the firms in the non-competitive sectors. Using capital stock estimates, together with an appropriate rental rate for capital services, these fixed cost estimates will often differ dramatically from estimates of capital derived from an input-output table, as is conventionally done in applied GE models. In input-output tables, capital income is computed as a residual. The difficulty of course is that this measure of actual income accruing to capital, assuming it is the residual factor, is much different than the income capital would earn were it earning its long-run opportunity cost. By using capital stock estimates together with a long-run rental rate on capital services, it is possible to estimate whether in any given year capital is earning more or less than its opportunity cost - that is, Marshallian quasi-rents. The description of industry structure in benchmark equilibrium is considerably more realistic if actual capital stock estimates are used to impute the total amount of physical capital in use in an industry.

This difficulty of the short run and the long run diverging means that the benchmark equilibrium is only a short-run equilibrium. Once long-run forces set in, such as entry and exit of firms, there is no reason the short run should be the same as the long run. In GET this turns out to be the case. The problem this presents is that the benchmark equilibrium does not serve to constrain model parameters completely. In particular, because the benchmark equilibrium is a short-run equilibrium, the industrial structure parameters such as markups are not explicitly constrained and will change in the transition from the short-run to the long-run equilibrium. It is possible, by changing some of the underlying behavioural parameters, to affect the long-run equilibrium but not the short-run benchmark equilibrium. In turn, by affecting the long-run equilibrium, the outcome of subsequent policy counterfactuals will be affected. It is necessary to arrive at some procedure to constrain the choice of behavioural parameters in order to put some discipline on the policy experiments.

In the implementation of GET the procedure in choosing among long-run equilibriums has been to use the best a priori evidence available; generally, however, this will not be enough to constrain all relevant parameters. So, in

addition, it is required that the long-run equilibrium produce economy-wide aggregates which are close to the short-run values. Thus national income, the wage and capital bill, and government revenues are all required to be similar in both the long-run and short-run equilibriums. The significance of putting this constraint on the model parameterization procedure will be discussed further in chapter 5.

GET - A GENERAL DESCRIPTION

In this section a general and non-mathematical description of the simulation model, GET, which is used for the trade and industrial policy simulations, is given. The following section gives a mathematical description of the model which should be of interest to specialists in the area of international trade. The simulation algorithm itself is a computer algorithm which solves for the sets of variables defined as equilibrium variables in the mathematical model.

GET is a model of a small open economy trading a set of commodities with the rest of the world. The model is implemented on a Canadian data set for the mid-1970s. Henceforth, the small open economy is understood to be Canada in the mid-1970s, and it will often be referred to as the domestic economy. The distinguishing characteristics of GET are given in the following list. Part A of the list covers those features which refer to the 'general' nature of the model within the class of general equilibrium models or analyses used by international trade economists. Part B of the list refers to those features of GET which relate to the incorporation of industrial-organization detail in some of the industries.

List A

1 There are twenty-nine domestic industries. Of these, twenty are considered candidates for incorporating details of industrial structure. The other nine are assumed to be strictly competitive constant-cost industries. The twenty potentially non-competitive industries correspond to Canadian manufacturing industries at the two-digit Standard Industrial Classification (SIC) level.

2 There are thirty commodity aggregates which are used in both final demand and intermediate demand. Of these thirty, twenty-nine of the aggregates are each composed of a domestically produced good, corresponding to

the domestic industry of the same name, and a foreign-imported good. In each commodity category of these twenty-nine, the foreign and domestic goods are close but imperfect substitutes in all demand categories; this is commonly referred to as the 'Armington assumption' after Armington (1969). The twenty-nine domestically produced goods are also sold abroad. Thus, each domestically produced good is both an export good and an import-competing good. The degree of import competition is determined by the relative share of imports in each industry. There is a final commodity aggregate, commodity thirty, which is non-competing imports. It consists of those goods for which there are no remote domestic substitutes, and neither is it exported.

3 Canada is viewed as an 'almost' small open economy in the goods markets (ASOE). This means that the border price of imports is not affected by anything the governments, consumers, or producers of the domestic economy do. The supply curve of imports facing Canada is perfectly elastic at the world price. This does not assume that the sellers of imports are in a perfectly competitive industry; it is merely a reflection of the size of Canada relative to other buyers of those import goods. In export markets Canada is assumed to face in aggregate less than perfectly elastic demand curves for its goods. The elasticity of export demand will differ across industries.[3]

4 Primary factors of production consist of labour and capital. Both factors are mobile across industries and firms. Both are treated as homogeneous and substitutable for each other. Labour is an internationally immobile factor. Domestic labour and the domestic capital endowment define the resource base of the domestic economy. Capital is an internationally mobile factor which is in perfectly elastic supply at the world rental rate. This is an ideal representation of the situation in which capital goods can be both exported and imported at constant prices, and the world interest rate is constant and taken as exogenous to the Canadian economy. Both the capital and labour markets are competitive.

5 GET is a real trade model which does not incorporate any considerations of monetary economics. Thus, the model is of the sort illustrated in any textbook on the theory of international trade. Since the model is in real terms there is no explicit mention of an exchange rate; all prices are measured in terms of a bundle of goods which are imported from abroad at constant prices. This means for example that the Canadian wage is defined as the nominal wage divided by a price index of imported goods. One implication of this formulation of the model is that balance-of-payments equilibrium is

assured automatically by Walras's Law. Balance-of-payments equilibrium in the model is current account balance; the surplus on trade account must equal interest and dividend payments on foreign-owned capital. It is possible within GET to introduce an arbitrary balance-of-payments deficit; the long-run equilibrium is defined such that this is automatically zero unless otherwise specified.

6 The demand side of the economy consists of intermediate demand, foreign demand, and export demand. Export demand is specified by a set of demand equations summarizing the behaviour of the rest-of-the-world (ROW) when faced with alternative sets of Canadian supply prices. Domestic demand is generated by imposing a utility-maximizing hypothesis on domestic consumers, including the government. Consequently, domestic final demand is determined entirely once aggregate disposable income and all prices are specified. The specification of preferences of domestic consumers is such that substitution between all commodity categories is allowed for in response to relative price changes.

7 GET includes many, but not all, of the relevant tax and tariff distortions of interest. Those included are the taxation of intermediate goods between different sectors at different rates, sales taxes on final domestic consumption, producer subsidies of various sorts, export taxes, tariffs, and ad valorem tariff equivalents of non-tariff barriers in both the domestic economy and the rest-of-the-world economy. Some of the distortions not included are differential treatment of capital between corporate and non-corporate sectors, differential treatment of capital income earned abroad and at home, and distortions introduced by the taxation of income at progressive rates. Since both domestic primary factors are assumed to be in inelastic supply by domestic resource owners, these factor market distortions are of no theoretical significance. It would clearly be desirable in a version of the model emphasizing tax policy to include them, and it would not be difficult.

List B

1 The competitive industries within the model are taken as constant-cost industries. They use labour and capital, together with intermediate inputs of both foreign and domestic goods, to produce a final homogeneous output good in each industry. In equilibrium, the price of output in these industries must equal unit cost. The competitive industries in the version of GET used

in this book include agriculture, the resource industries, construction, utilities, and the service sector.

2 The twenty manufacturing industries are described in much greater detail than the competitive sectors are. In particular, the degree of competition is endogenous in these sectors, and the description of technology allows for decreasing costs. Each of these industries is made up of a number, endogenously determined, of representative firms. Each firm is identical in that it has the same technology and same behavioural rules for setting price. Consequently, the firm, as opposed to the industry, is an identifiable entity within GET, and the nature of costs within the firm is an important feature. Each firm has a technology which is characterized by constant per-unit variable costs and fixed costs. The firm is defined by the requirement that fixed costs are on a per-firm basis. Thus, strictly speaking, it is sensible to think of the firm and a plant as the same thing. Fixed costs consist of the capital and labour necessary to set up a plant of minimum size and the product-specific costs associated with the products produced within the plant. As the plant becomes more horizontally diversified, these product-specific fixed costs will rise. Replication of firms requires the replication of fixed costs.

3 Firms set their price in accordance with the perceived degree of competition they face in either close or perfect substitutes. In the version of GET used here, there are two factors taken into account in setting price. First is the elasticity of the demand curve the firm perceives for its product. In the model this elasticity is determined by such variables as the elasticity of substitution in demand between foreign and domestic products, between one industry's product and other industries' products, and between the products of different firms within the same industry. Other variables include the number of firms in the industry, the elasticity of export demand, and the elasticity of intermediate demand. The second factor the firm must take into account is the aggressiveness of price competition by domestic and foreign competitors. The Eastman-Stykolt hypothesis (1967) is that domestic competition is relatively non-aggressive but that foreign firms set a ceiling on domestic prices by offering to sell the same product as the domestic firm at the world price. The foreign price inclusive of the domestic tariff becomes a price which a perfectly collusive oligopoly could price up to without inducing massive substitution into the foreign market. The perceived-demand-curve approach which involves non-co-ordinated but non-aggressive pricing is re-

ferred to as the monopolistic pricing hypothesis (MCPH). In GET within the manufacturing industries, prices are set in accordance with a mixture of the MCPH and the Eastman-Stykolt hypothesis (ESH).

4 Some results will be briefly reported on a version of GET which incorporates product differentiation through the 'elasticities approach' introduced by Spence (1976); some applications of this approach have been used in recent years in other areas of economics.[4] In this version of the model each firm produces a set of products which is viewed as a symmetric but imperfect substitute for the products made by all other firms within the industry both at home and abroad. Industry 'output' is an aggregate of a large number of highly substitutable goods. Under the assumption of product differentiation there are real income gains to having more products - this is a strong effect working against rationalization. Gains in scale economies must be balanced against reduced product variety. The 'elasticities approach' to product differentiation, while interesting, is deficient in numerous respects. It literally means, for example, that consumers view a pair of sneakers made in Taiwan that are physically identical to sneakers made in Canada as imperfect substitutes. Consequently, the welfare results with product differentiation should be interpreted with considerable caution.[5]

One of the difficulties with modelling product differentiation in an open economy model is that some assumption must be made about the nature of the product differentiation decision by foreign suppliers in the face of changes in domestic product differentiation. Two possibilities suggest themselves as reasonable hypotheses. One is that the foreign suppliers match any change in domestic variety such as to maintain market share constant in the absence of any price competition. This is referred to as the competitive foreign product differentiation (CFPD) hypothesis. The other reflects a much more passive competitive stance by foreign firms. Assume that any product dropped by a domestic industry is automatically provided by a foreign supplier, or any product added by a domestic firm results in the displacement of a similar or identical product provided by a foreign firm. This is referred to as the replacement hypothesis. It results in a constant product set in the domestic economy. Neither assumption is very realistic, although both incorporate elements of market structure that are thought to be important. The major difficulty again is that we have very little quantitative knowledge about the importance of these various hypotheses.

5 The presence of scale economies and imperfect competition means that

with an exogenously given number of firms there is no assurance that pure economic profits are zero. Typically in such a 'short-run' situation, defined by the fixity of the number of firms in the industry, Marshallian quasi-rents, positive or negative, will be earned by the existing firms in the industry. GET is a model of long-run equilibrium. It is assumed that entry or exit of firms will occur until these rents, or losses, are dissipated. Long-run equilibrium requires not only that all product and factor markets clear but also that all industries be in a position of normal profit. This type of equilibrium concept excludes from consideration the possibility of above-normal profit industries, for example, due to entry barriers or government restrictions. While the assumption can be relaxed it seems the most appropriate for a long-run static analysis.

List A and List B constitute most of the important features of GET. The mechanism by which the economy responds to exogenous shocks is different in GET than in traditional neoclassical models. The single most important price in the model is the Canadian real wage. As the rental rate on capital is set in the world market, changes in the wage have numerous effects.

On the production side a wage change induces substitution between capital and labour at the level of the individual firm. It affects the cost at which firms can sell their products and remain profitable; through this channel it causes changes in all domestic product prices. Changes in product prices, of course, affect demand for the products in question, and this sets up the forces to shift resources intersectorally. The rise in the wage will raise capital/labour ratios, causing firms to substitute into capital. On the other hand, the rise in the wage raises prices which reduce demand for the product; the more labour-intensive the industry, the more its price will rise. In a general equilibrium framework, a rise in the wage raises domestic income, and this has the effect of raising demand. Thus, the price and income effects of the rise in the wage are working in different directions.

In industries with significant scale economies there are some additional effects at work. A rise in the wage at constant product prices causes the industry to incur losses or negative Marshallian quasi-rents. Either prices must rise to restore the industry to a normal profit situation, or exit must occur so that total industry capacity just earns normal profits. Exit means that the amount of fixed costs incurred in the industry goes down. It is this effect which is missing in the constant-cost model. An initial cost change can

be translated into either price increases or decreases in the number of firms and the realization of lower average cost in decreasing-cost industries. It is here that the possibility emerges for significant differences between the neoclassical and the industrial-organization views of resource allocation.

Determining how a rise in the wage will affect an industry depends upon its pricing policy and the relative labour intensity of its fixed and variable costs. The discussion of wage subsidies in chapter 3 is relevant here. Industries with significant scale economies are thought to be more capital-intensive than industries without scale economies. Thus, a rise in the wage raises their variable costs relatively less than in a labour-intensive industry. A rise in the cost of capital services would be significantly more important.

In the non-competitive industries, prices are arrived at by setting a markup on variable costs. Any policy which affects the markup will have important consequences. Lower markups mean that the firm, to remain profitable, must produce a larger volume of output; in equilibrium this large output per firm must be achieved by having fewer firms, a larger industry output, or both. Any policy or exogenous change which affects markups will have an effect on the industry through this scale effect. Two examples which will turn out to play an important feature in later chapters are worth discussing. Under the ESH, a cut in the domestic tariff forces down the markup in import-competing industries. This necessarily means that the industry must rationalize in some sense. If this translates into significant productivity gains they will ultimately show up in either higher wages or lower consumer prices in those industries, or some combination of the two factors. Under the MCPH hypothesis, increases in the elasticity of the perceived demand curve will lead to lower markups via the Lerner pricing rule. As the perceived elasticity is related to the true underlying elasticities in long-run equilibrium, a shift in the composition of demand facing an industry can raise the perceived elasticity. For example, reduced foreign tariffs may result in some industries' shifting their output toward foreign buyers. If external demand is more elastic, this will raise the elasticity of the perceived demand curve. This in turn will cut the markups and force rationalization of some sort in that industry. In the extreme case with a perfectly elastic foreign demand curve, the industry would be forced to become competitive and sell at the world price. Alternatively, a shift towards buyers with more inelastic demands will raise markups and have the opposite effect.

As discussed in List B, the long-run equilibrium concept in GET is one

of no pure economic profit, or of all capital earning the normal rate of return. Pure profit is dissipated by entry. GET is easily modified to include entry barriers. One such equilibrium will be discussed in chapter 6. In these situations the mechanism by which resources get reallocated is quite different. For example, a rise in the wage does not necessarily induce exit if the industry is an initial position of positive profit. In this case the rise in the wage will raise variable costs and hence prices. The reduced demand for the industry's product will be met by existing firms' cutting back production; with decreasing costs average costs will rise and the absolute efficiency of production will be lower. The possibility of preserving efficiency by the exit of firms is not present.

How does the doctrine of comparative advantage hold up in such a framework? In theoretical papers by Helpman (1981) and Krugman (1980a), both of which emphasize product differentiation as the main departure from the traditional Heckscher-Ohlin model, it is demonstrated that traditional comparative advantage is not the only source of trade. Countries identical in all respects will trade because of the benefits of specialization available through scale economies, or under product differentiation the benefits of having greater variety in world product markets. In addition, GET has the effect that changes in trade may induce changes in the degree of competition in domestic industry; this in turn will affect the pattern of trade.

In chapter 2 the arguments of Balassa and others on the possibility of intra-industry trade and its importance were discussed. It should be clear that GET contains most of those factors. If the Canadian economy is divided roughly into manufacturing and primary sectors, then traditional comparative advantage argues that the export sector should be primary. Furthermore, trade liberalization will lead to an expansion of this sector at the expense of manufactures. The presence of scale economies and imperfect competition in the manufacturing industries, however, provides an additional set of considerations. Changes in the absolute productive efficiency of the manufacturing sector, through some type of rationalization, can shift the comparative advantage towards manufactures. This source of change in the endogenously determined comparative advantage of Canada's industries is the most important departure of GET from the traditional neoclassical model. Emphasis should be placed on the word 'endogenous' here. The absolute efficiency of the manufacturing industry is determined by a number of factors which are endogenous to the model. Changes in policy variables or other exogenous variables

can affect the comparative advantage of the Canadian economy. By how much the comparative advantage can change is a quantitative matter to be explored in the next chapter.

THE MATHEMATICAL MODEL

This section presents the mathematical version of the model outlined above. This model and its variations are the analytical basis for the policy simulation program, GET, which is used in chapters 5 and 6. At various points comments are given on the interpretation and implications of mathematical assumptions.

It is important to emphasize the aggregation basis for the model under product differentiation. Industry 'output' is a composite commodity aggregate of the output of a number of goods, all symmetric but imperfect substitutes. For example, if the shoe industry produces two pairs of sneakers and two pairs of slippers, total output is referred to as four pairs of 'shoes.' This aggregation procedure is the basis for empirical implementation.

Table 8 lists some of the relevant notation used in this section. The model will be detailed without taxes, tariffs, or subsidies. In the empirical implementation of the model most of the relevant tax and tariff distortions are present.

Technology

In this subsection the technology of firms is described in detail. Costs are divided into fixed and variable costs. Variable unit costs are defined as those independent of the level of output. Denote the unit variable cost function as v^i (P). The particular form used for v^i is the Cobb-Douglas:

$$\log v^i(P) = \alpha_{oi} + \Sigma_{j\varepsilon M}\alpha_{ij} \log w_j^i + \Sigma_{k\varepsilon}\ \alpha_{ik} \log q_k + \alpha_{iw} \log w + \alpha_{ir} \log r,$$

where w_j^i is a price index of a composite input used by industry i, a composite of both foreign and domestic inputs from commodity j. w_j^i is assumed to have the form

$$\log w_j^i = \beta_{ij} \log p_j + (1 - \beta_{ij}) \log p_j^*. \qquad (1)$$

TABLE 8
Notation

N:	index set for non-competitive industries
C:	index set for competitive industries
B:	index set for non-competing imports
	$M = N \cup C \qquad G = M \cup B$
(p_i) $i \varepsilon M$	domestic commodity prices
(p_i^*) $i \varepsilon M$	foreign commodity prices
(q_i) $i \varepsilon B$	foreign prices on non-competing imports
w:	domestic wage
r:	world rental rate on capital
P:	(p, p^*, q, r, w): price system
D_i:	domestic product set for $i \varepsilon N$; $n_i = \#(D_i)$
D_i^*:	foreign competing product set, $i \varepsilon N$; $n_i = \#(D_i)$

Equation (1) is unsatisfactory in that foreign and domestic intermediate inputs have a unitary elasticity of factor substitution; it also implies that the degree of product differentiation in each industry has no effect on intermediate demand for the composite input. The input/output matrices for the economy are derived from the unit cost functions assuming price-taking behaviour in input markets. The domestic Leontief matrix $[a_{ij}(P)] = A(P)$ is defined by

$$a_{ij}(P) = \alpha_{ij}\beta_{ij}v^i(P)/p_j, \tag{2}$$

where a_{ij} is the demand for domestic composite good j, per unit output of composite domestic good i. The Leontief matrix for foreign imports $A^*(P)$ is defined as

$$a_{ij}^*(P) = \alpha_{ij}(1-\beta_{ij})v^i(P)/p_j^*.$$

If Z denotes the vector of total domestic outputs, X the vector of final domestic demands, and M the vector of imports for use as intermediate goods, we have the following relationships:

$$X + A(P) \cdot Z = Z, \tag{3}$$
$$A^*(P) \cdot Z = M. \tag{4}$$

Each representative firm in each non-competitive industry, $i \varepsilon N$, has non-zero fixed costs. These are given by the function

$$F_i(r,w,k_i) = (rf_K{}^i + wf_L{}^i) + (rh_K{}^i + wh_L{}^i)(k_i-1)^{\gamma_i}, \; k_i \geq 1. \tag{5}$$

Plant fixed costs include $f_K{}^i$ units of capital; this is the amount of capital required to produce the minimum number of product lines k_i, defined as k_i = 1. Plant fixed costs also include $wf_L{}^i$ in labour costs; this can be thought of as the fixed labour requirements to keep the plant open. The second part of the cost function represents the amount of product-specific capital and labour required as the number product lines k_i increases beyond the minimum. These would include the additional capital necessary in horizontally diversified plant plus the additional labour costs associated with product changeovers.[6]

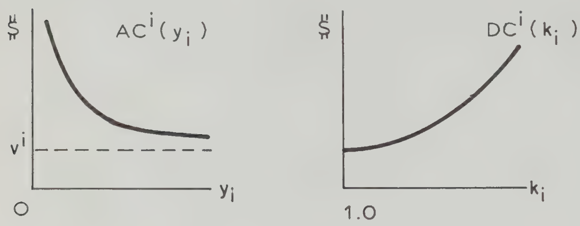
The fixed cost function (5) can be restricted so that the fixed-capital/fixed-labour ratio, is the same in both plant and product-specific fixed costs. The implications of this assumption will be explored below.

Define z_i as the length of the representative production run in the representative firm in industry i. Total output in the firm is defined as $y_i = k_i z_i$. Total costs in the firm are

$$TC_i = v^i(P)y_i + F_i(r,w,k_i). \tag{6}$$

Let $AC^i(y_i|k_i)$ be average cost per unit output <u>given</u> a fixed number of product lines. Let $DC^i(k_i|\bar{y}_i) = v^i + F_i(k_i)/\bar{y}_i$ be average cost per unit of output as the number of product lines varies, holding total output constant. Figure 7 illustrates the relevant assumptions regarding these costs. While k_i should be treated as an integer variable, it does little harm to treat it as continuous. MES output is defined as that y_i where average cost is within 1 per cent of average variable cost. In the model most firms will operate at MES or below. Low-fixed-cost industries will be relatively competitive with small MES and large numbers of firms. Formally, the cost function of the multiproduct firm as specified in (6) incorporates 'economies of scope.'[7] Economies of scope mean that a firm lowers its total cost by producing a diversified output vector, <u>taking into account the possibility of replication of</u>

Figure 7
Average cost curves for a single firm as a function of output and as a function of the number of product lines



plants. Thus, although there are economies to specialization within the plant, over a range of product diversity total costs are lower by producing multiple products within a single plant, in order to avoid incurring the additional plant fixed costs associated with replicating plants.

In the version of the model without product differentiation (PD), the number of products per plant, k_i, is treated as a constant equal to $\bar{k}_i$. With perfect substitutability between products within an industry there is no reason for firms to produce additional product lines beyond the cost-efficient number in this particular model.

Final demand specification

Final demand in each commodity category consists of export and final domestic demand. One specification of export demand (ROW) for representative product u in industry i is

$$e_{iu} = \hat{\Gamma}_i(p_{iu}/p^*)^{\lambda_i}(\hat{n}_i/n_i). \tag{7}$$

The functional form in (7) incorporates a unit elastic 'crowding out' effect of domestic product differentiation n_i relative to ROW competing product differentiation $\hat{n}_i$. In equilibrium, all $e_{iu} = e_i$ and $p_{iu} = p_i$, so total export demand for industry i is

$$E_i = n_i e_i = \Gamma_i(p_i/p_i^*)^{\lambda_i}. \tag{8}$$

Equation 8 is also widely used for non-PD cases (see Evans 1972 for example). The small open economy (SOE) hypothesis implies Γ_i and $\hat{n}_i$ are constant. It would be very difficult to empirically implement a non-unit elastic PD crowding-out effect.

In using the specification of export demand in (7) there is a particular difficulty which relates to the interpretation of the ROW. In reality, the ROW is not a single country but many countries, and Canadian exports compete with many other countries' exports in the world export market. Without builiding a world GE model, it is very difficult to adequately capture this in a reduced-form, export-demand equation. The following might be viewed as a half-way approach.

The ROW is thought of as consisting of many countries both exporting and importing. In any particular commodity category there is a world demand for a composite export good, which is an aggregate of all relevant countries' exports. The composite export good is defined as

$$Q = [\delta E^{-\lambda} + (1-\delta)E*^{-\lambda}]^{-1/\lambda},$$

where E is domestic exports, and E* is ROW exports; $\sigma* = 1/(1+\lambda)$ is the elasticity of substitution between domestic and ROW exports in world demand. Letting p and p* be the price paid by world consumers of domestic and ROW exports, the price index for the export composite is

$$P = [\delta^{\sigma*}p^{(1-\sigma*)} + (1-\delta)^{\sigma*}p*^{(1-\sigma*)}]^{[1/(1-\sigma*)]}. \tag{9}$$

For a given Q, cost minimization yields the demand for domestic exports:

$$E = \delta^{\sigma*}(P/p)^{\sigma*}Q. \tag{10}$$

We now postulate a conventional demand for world exports of the form $Q = \alpha p^{-\varepsilon}$, in which case, substituting, we get the demand for domestic exports given by

$$E = \alpha'[\delta^{\sigma*}p^{(1-\sigma*)} + (1-\delta)p*^{(1-\sigma*)}]^{[(\sigma*-\varepsilon)/(1-\sigma*)]}/p^{\sigma*}. \tag{11}$$

The importance of this specification is in its implication for price and foreign tariff elasticities. Let t* denote the ad valorem tariff rate against domestic and ROW exports. Then

$$(\partial \log X)/(\partial \log (1+t^*) = -\varepsilon$$

and

$$(\partial \log X)/(\partial \log p) = -[\theta\varepsilon + (1-\theta)\sigma^*],$$

where θ is the domestic value share of world exports, $p(1+t^*)X/PQ$. Thus, price elasticities of domestic exports depend not only on the world export elasticity but also on the extent to which domestic and ROW goods are viewed as substitutes. For example, it is quite conceivable that the aggregate export elasticity ε is a reasonable value such as 3 but that a particular country's export price elasticity is quite low because its share of the world export market is low and σ^* is only a moderate value, say 1. This would typically be the case, for example, of industries which are thought to be import-competing.

Domestic final demand is generated by treating the economy as a single consumer. Adding multiple consumers would add little to the industrial-organization aspects of the model.[8] The consumer maximizes a utility function over all commodity categories of the log-linear form

$$\log U = a_o + \Sigma_{i\varepsilon G} a_i \log C_i. \tag{12}$$

For non-competing imports $i\varepsilon B$, C_i represents the amount of the import good. For $i\varepsilon C$, competitive industries, the 'Armington' assumption is used; foreign and domestic goods are imperfect substitutes as reflected in the CES aggregator:

$$C_i = [\delta_i x_i^{\rho_i} + (1-\delta_i)X_i^{*\rho_i}]^{1/\rho_i}, \tag{13}$$

where x_i and x_i^* are domestic and foreign components respectively of final demand.

In PD industries a Spence (1976) type generalization of (14) is used which allows the product set to vary:

$$C_i = [\sum_{k\varepsilon D_i} x_{ik}^{\rho_i} + \sum_{k\varepsilon D_i^*} x_{ik}^{*\rho_i}]^{1/\rho_i}. \tag{14}$$

The common elasticity of substitution between all goods in category i is $\sigma_i = 1/(1-\rho_i^*)$ for $i\varepsilon N$, $\sigma_i > 1$.[9] In equilibrium all $x_{ik} = x_i$ and all $x_{ik}^* = x_i^*$.

Given disposable income Y and prices P, the demand for a representative product in industry i by consumers is

$$x_i = a_iY\ [p_i^{-\sigma_i}/(n_ip_i^{-\sigma_i+1} + n_i{*}p_i{*}^{-\sigma_i+1})]. \tag{15}$$

Multiplying by the number of domestically produced goods n_i gives total consumer demand for the domestic composite i, X_i,

$$X_i = n_ix_i = a_iY\ [n_ip_i^{-\sigma_i}/(n_ip_i^{-\sigma_i+1} + n_i{*}p_i{*}^{-\sigma_i+1})]. \tag{16}$$

In (17) the relative number of domestic to foreign-imported goods (n_i/n_i^*) acts like a share parameter in the conventional CES function. Consequently, at constant terms of trade, the domestic industries' share in domestic consumption is increasing in the ratio n_i/n_i^*. (14) also incorporates the usual Chamberlin taste for diversity on the part of consumers.[10]

Short-run equilibrium

The 'short run' is a period in which industry structure is fixed. The following variables are held constant:

(1) Markups on unit cost by firms, $i\varepsilon N$. $(m_i) = m$
(2) Number of firms in each industry, $i\varepsilon N$.
$(Fm_i) = Fm$.
(3) Number of product lines of each firm. $(k_i) = k$.
(4) Domestic and foreign PD each $i\varepsilon N$. n and n*.

Let S = (m, Fm, k, n, n*) be the vector of structural variables. All other economic variables adjust within the short run. This includes commodity and factor prices, outputs, employment of variable factors, etc. This short run is a close analogy to the Marshallian short run of textbook economics.

In the short run, pure profits and losses will occur in each of the industries, $i\varepsilon N$. Let π_i denote industry i's pure profit or loss after paying all factors' opportunity cost. Aggregate consumer income is given by

$$Y = wL + rK_D + \Psi\ \Sigma_i\ \pi_i. \tag{17}$$

L is the aggregate labour endowment, K_D the domestic capital endowment, and Ψ the share of domestic ownership in industry; these are taken as exogenous (even in the long run) variables.

Equilibrium commodity prices are determined by the equations

$$
\begin{aligned}
p_i &= m_i v^i(P) \quad i\varepsilon N \\
p_i &= v^i(P) \quad i\varepsilon N.
\end{aligned}
\tag{18}
$$

Solving equation (18) will determine domestic commodity prices as a function of factor prices (w,r) and world prices $(p_i^*)(q_i)$. With the exception of w, all other prices in P are determined, given S. Let X(P,Y,S) and E(P) denote final demand vectors. Commodity market clearing implies the vector of total outputs $Z = (Z_i)_{i\varepsilon M}$ must satisfy

$$Z = [I - A(P)^T]^{-1}[X(P,Y,S) + E(P)]. \tag{19}$$

Labour market clearing, given the vector of domestic outputs, is

$$L = \Sigma_{i\varepsilon M} a_{iw}(P) Z_i. \tag{20}$$

Industry profits π_i are

$$\pi_i = Fm_i(p_i - v^i)(Z_i/Fm_i) - F_i(r,w,k_i). \tag{21}$$

A short-run equilibrium for a given S is a wage w(S), income Y(S), and vector of outputs Z(S) satisfying (18)-(21). This definition has to be modified with the addition of taxes and tariffs in the usual way. Walras's law implies a balance-of-payments equilibrium of the form

$$\Sigma_{i\varepsilon m} p_i E_i - \Sigma_{i\varepsilon G} p_i^* M_i = r(K-K_D) + (1 - \Psi)\Sigma_i \pi_i. \tag{22}$$

Surplus on trade account equals rental payments on net capital service imports $(K-K_D)$ plus quasi-rents to foreign ownership, $(1-\Psi)\pi$. K is total domestic demand for capital services.

With PD the following identities hold: $n_i = Fm_i k_i$, $y_i = Z_i/Fm_i$. In non-PD equilibrium n_i, n_i^*, and k_i are treated as constants in both short and

long run.

Firm behaviour

We now turn to observe how the firm behaves with respect to its pricing and product decisions. The earlier discussion dwelt upon these issues at some length. Under MCPH each firm in each industry has a perceived demand curve for its representative product, holding the number of products fixed. Let Z_{iv} be the perceived demand in industry i, by firm v, for its representative product. The perceived demand curve for this product is assumed to have the constant elasticity form,

$$Z_{iv} = \Psi_{iv} p_{iv}^{-\varepsilon_{iv}}. \tag{23}$$

The optimal pricing rule, given (23), is the Lerner formula:

$$(p_i - v^i)/p_i = 1/\varepsilon_i, \tag{24}$$

where the firm subscript has been dropped for convenience. Later the problem of where ε_i comes from is addressed.

Under the Eastman-Stykolt hypothesis (ESH) the firm sets its price equal to the import-competing goods price, inclusive of the domestic tariff, $t_i q_i^*$:

$$p_i = q_i^*(1 + t_i). \tag{25}$$

As discussed earlier this is a type of aggressive pricing policy which might be expected in non-product-differentiated industries. In many of the policy simulations discussed, a mixed pricing hypothesis is adopted (MPH) in which the price set is an average of the MCPH and ESH prices.

In the case of product differentiation it remains to determine the optimal k_i^*. Let z(p,k) denote the perceived demand curve facing a firm for a representative product, given its price p and number of product lines k. The firm solves the problem

$$\max_{p,k} \ (p-v)z(p,k)k - F(k), \tag{26}$$

where F(k) is total fixed costs as a function of k. At the optimum, the first-order condition for k is given by

$$(p-v)z(p,k) + (p-v)z_k(p,k) - F'(k) = 0. \tag{27}$$

To make the problem tractable, the individual firm in each industry is assumed to take total industry demand Z as given and unchanged by changing its number of products. The firm observes that its current demand per product is $\hat{z} = \hat{Z}/\hat{n}$, where $\hat{n} = \hat{k}\hat{F}m$, its current number of product lines is $\hat{k}$, and it contemplates adding Δ product lines. Its approximate problem is to choose Δ to maximize

$$(p-v) \{ \hat{k} (\frac{\hat{Z}}{\hat{n} + \Delta}) + \Delta\hat{z} \} - F(\hat{k} + \Delta). \tag{28}$$

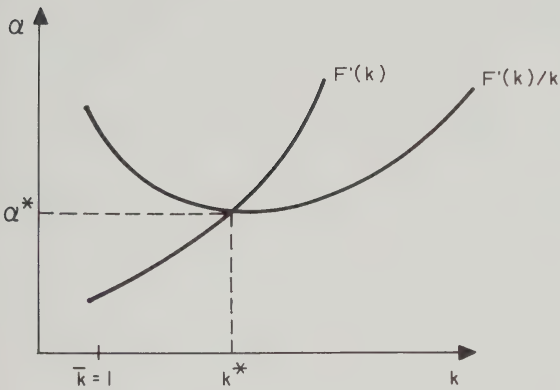
Solving this problem and noting that in equilibrium, $k = \hat{k}$, or $\Delta = 0$, gives the first-order condition

$$(p-v)\, y[1 - (1/F_m)] = F'(k)k, \tag{29}$$

treating k as a continuous variable. Clearly, more sophisticated hypotheses are possible, but this one seems informationally realistic.

An implication of (29) is that for industries with a very large number of firms, (29) becomes approximately (p-v) z = F'(k). The zero-profit condition is (p-v) z = F(k)/k. Treating (p-v)z = α as variable, these jointly determine (α,k) as in Figure 8. Analogous to the Marshallian analysis of firm output, k* is determined independently of α and is given by the intersection of average and marginal fixed cost curves. Thus the only things which shift k* will be changes in the fixed-cost technology or factor prices. Corner equilibria are the other possibility as in Figure 9. In Figure 9, the firm has the minimum number of product lines. Note that in both cases α must adjust in long-run equilibrium to α*. The composition of α between output and markup is determined essentially as in the Chamberlin model and is closely related to the perceived elasticity of demand. The more elastic the perceived-demand curve, the lower the markup, and hence the greater the output from the plant on a given product. Changes in markups are clearly an important source by which the benefits from scale economies are achieved. Another

Figure 8
Determination of the optimal number of product lines



important effect here occurs through changes in the wage rate. An increase in the wage will shift both the average and marginal curves up. Given the fixed cost function (5), one can show, for the industry equilibrium k*, determined by $F'(k^*,w,r) = F(k^*,w,r)/k^*$, that

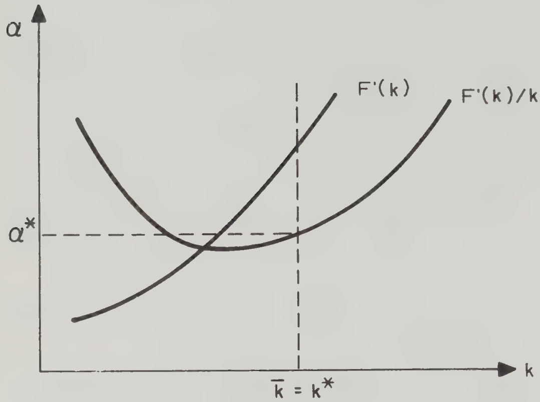
$$\text{sgn}\ (dk^*/dw) = \text{sgn}\ (L_P/L_D - P/D),$$

where L_D is the labour used in diversity fixed costs, L_P is the labour used in plant fixed costs, $P = wf_L + rf_k$ (plant fixed costs), and $D = (wh_L + rh_k)(k-1)^\gamma$ (product fixed costs). For example, if the only fixed costs associated with labour are on product line changeovers, then $L_P = 0$ and k* will decrease with an increase in w. If the fixed-capital/fixed-labour ratio is the same in both plant and product fixed costs, then k* is unaffected by changes in w.[11]

In this model, the benefits from product rationalization within the plant occur at that particular k* where the total fixed costs are minimized in providing some aggregate number of products. For example, suppose an omniscient planner wants to deliver N products, all in quantities z. To minimize the aggregate cost of doing so, he would solve

(I) choose k to min $Nvz + (N/k)F(k)$.

Figure 9
Determination of the optimal number of product lines: boundary case



It is clear he would want to minimize average fixed costs per product, or choose k = k*. The upshot of this discussion then is that large numbers competition, given the decision rule (29), results in an approximately efficient degree of horizontal product diversity within the firm. With small firms numbers this will not be true.

It is worth noting that increases in w will increase minimum fixed costs α^*. This is an important adjustment mechanism in the model. Higher fixed costs may yield fewer firms in equilibrium, or longer production runs, or both.

Entry, perceived demand, and long-run equilibrium

To close the model, firms enter and exit in response to the presence of pure profits and losses. Thus we have the classic Marshallian adjustment process. A long-run equilibrium is a short-run equilibrium with two additional conditions: (1) all industries are in (approximately) a zero pure profit condition; (2) under MCPH the perceived elasticity is the 'true' elasticity. What is the true demand curve of the firm? Condition (2) requires that the firm be locally correct in its perceptions as to its true demand curve. There are clearly different routes one can take in constructing the true demand curve.

Begin with the identity for total industry output

$$Z_i = X_i + E_i + \Sigma_{j\varepsilon M} I_{ji}, \tag{30}$$

where $I_{ji} = a_{ji}Z_j$, intermediate use of i by j. The elasticity of Z_i with respect to a variable x is[12]

$$\eta_x(Z_i) = (X_i/Z_i)\, \eta_x(X_i) + (E_i/Z_i)\, \eta_x(E_i) + \Sigma_{j\varepsilon M} (I_{ji}/Z_i)\eta_x(a_{ji}Z_j). \tag{31}$$

The firm calculating its elasticity does a general equilibrium comparative statics exercise, changing its own price and taking the following as constant: all other prices, product differentiation, aggregate income, and the output of other industries. The last one is the most crucial. It implies that the firm does not account for induced changes in intermediate demand as a result of changes in the marginal cost of production to other industries. Consequently, the elasticity of intermediate demand arises solely from the factor substitution effect. Hence, $\eta_x(a_{ji}Z_j) = \eta_x(a_{ji})$.

An alternative to this would be to differentiate (30) totally, but this is an extremely complex calculation. An implication of (30) is that shifts in the composition of total demand will change the elasticity and hence markup.

In going from (31) to the firm's elasticity, the formula is essentially the same, given the assumption of symmetric substitutes, and assuming that all firms share the same proportions of each demand category.

The component elasticities under PD are as follows:

$$\eta^i_X = -\sigma_i + s_i(\sigma_i - 1)/Fm_i \tag{32}$$

$$\eta^i_E = \lambda_i \tag{33}$$

$$\eta^i_{Ij} = \tau_{ij} + \tau_{ij}\, (\alpha_{ij}\beta_{ij}/Fm_i) - I\ , \tag{34}$$

where $s_i = p_iX_i/a_iY$. Equation (32) is self-explanatory. Equation (34) giving the elasticity of intermediate demand introduces the parameters τ_{ij}. In each industry j the <u>perceived</u> input from domestic i is taken as a CES aggregate with elasticity of substitution τ_{ij}. This yields the output-constant factor demand elasticity (34). In the true model, however, the aggregator is Cobb-Douglas with share parameters $\beta_{ij}\alpha_{ij}/n_j$ on each domestic product in category

j. The difficulty with maintaining the Cobb-Douglas assumption is that intermediate demand elasticities are very close to -1; this yields unreasonably high markups. In the simulation model, the τ_{ij} are chosen in the range 3.0 and 5.0.

Under competitive foreign product differentiation (CFPD), (n_i/n_i^*) is held constant. This hypothesis on the behaviour of importers seems reasonable as it keeps their market share constant, given constant industry terms of trade. The other PD hypothesis discussed previously includes both no change in foreign product differentiation, n_i^* constant, and the replacement hypothesis, n_i^* adjusts such that $n_i + n_i^*$ = constant.

The long-run equilibrium is not necessarily unique. This is a standard theoretical problem in simultaneous general equilbrium models.[13] In practice, though, it does not seem to exist in GET. As in the long run, all pure profits are dissipated, balance-of-payments equilibrium simply amounts to current-account balance; trade surplus must equal dividend and interest payments to foreigners. In a long-run static model such as this the dynamic character of the economy is completely lost. Two of the most serious of these deficiencies include the lack of distinction between consumption and investment goods and the inability to incorporate the impact of domestic savings propensities on long-run equilibrium. Both problems are common to most applied general equilibrium models.

5
Trade policy experiments

INTRODUCTION

In this chapter the trade policy experiments discussed in chapter 3 are evaluated using the GET simulation model. The basic trade policy experiments are: removal of all domestic tariffs or unilateral free trade (UFT), removal of all foreign and domestic trade barriers in tariff-equivalent form or multilateral free trade (MFT), and selective removal of tariffs on the manufacturing industries of Canada. The impact of raising foreign and domestic tariffs is also examined. In order to carry out these policy simulations the various parameter values of the model are set at what are referred to as the 'best guess' estimates. These provide what are felt to be the most plausible parameter values based on the evidence available and the a priori knowledge as to unreasonable outcomes. The version of GET used primarily in this chapter is the non-product-differentiated version discussed in chapter 4, using the mixed pricing hypothesis in non-competitive industries. In this model there are three key sets of parameters; economy-of-scale estimates, import elasticities, and export elasticities. The estimates of these which are used in the model are discussed in Appendix A.

As is well known, the estimates of all these parameters are known to be rather unreliable and subject to numerous biases. Consequently, a great deal of sensitivity analysis is done to check the model outcomes as these parameters vary. The equilibrium which corresponds to the 'best guess' values is referred to henceforth as the reference equilibrium. Some of the key characteristics of this equilibrium are reported in the tables in Appendix B. The basic assumption underlying this equilibrium is that it reflects 'elasticity opti-

mism' on both exports and imports relative to the econometric estimates, and scale economy estimates which are midway between econometric estimates and engineering estimates. The justification for the elasticity optimism is twofold. First, it is known that standard econometric estimates of these elasticities are biased downwards in absolute value. Second, they are available at a level of aggregation much below that used in this model. Disaggregation will cause elasticity to rise because of substitutability between the various commodities within any given aggregate (Rousslang and Parker 1981).

The impact of elasticity optimism on the results is not clear-cut because of opposing tendencies. For UFT experiments, raising import elasticities (in absolute value) will generally lower the net benefits because of increased import substitution effects. On the other hand, raising export elasticities will increase the net benefits because of a smaller adverse terms-of-trade effect. Changing these elasticities will also affect the industrial rationalization effects, but in which direction is not a priori evident. With respect to MFT, all the UFT effects occur, but in addition there is the increased world demand for domestic exports. Clearly, raising export elasticities will increase the export demand effect, given the cut in foreign tariffs, although there could conceivably be an adverse-terms-of-trade effect offsetting this. As will be seen below, some of the results are sensitive to the elasticity assumptions, and all results should be interpreted with appropriate caution.

In reporting, results are given both for broad aggregates and industry results in the case of the twenty manufacturing industries. Because of the large volume of results at the industry level it is not possible, nor particularly valuable, to examine each industry in any great depth. A reader interested in a particular industry will be able to discern from the tables the impact of any particular policy on that industry. Some discussion will be devoted to 'winners and losers' for the case of UFT and MFT, and to the reasons some industries do particularly well or particularly badly.

Finally, before going on to discuss results, a word of caution and a reminder. The results reported are for the Canadian economy in the mid-1970s; this means that the policy experiments are for the technology and trade barriers that were in place at that time. Since 1976 there have been some dramatic changes in the world economy. These include the second oil price shock, the accelerating inflation and subsequent recession and deceleration of inflation in the world economy, the strong shift to protectionism, and rapid technical change occurring in many industries due to the advances in

microelectronics. Many of these changes have been so dramatic that the results obtained on various policy experiments should be interpreted as applying to the current situation with considerable caution, particularly at the industry level. Nevertheless, they provide some evidence of the relevant quantitative magnitudes involved in each policy experiment considered.

UNILATERAL FREE TRADE

In this section the results of a unilateral free trade experiment are discussed. First, the aggregate results and then some industry results are reported. The relevant Tables are 9 through 14. The construction of domestic nominal tariffs is detailed in Appendix C. The tariff used in the model includes nominal domestic duties and the ad valorem tariff equivalent form of non-tariff barriers. These tariffs run from as high as 33 per cent in the clothing industry to no tariffs in construction. The distinguishing feature of the tariff structure is the wide variation across industries. UFT involves removal of all domestic tariffs, holding constant all other taxes and foreign tariffs in place.

UFT-aggregate results

The effect of UFT on the domestic economy in terms of aggregate variables is detailed in Tables 9 and 10. The major distinguishing characteristic of UFT is the rationalization which occurs in the domestic manufacturing industries and the resulting productivity improvements. There is a 20 per cent increase in aggregate labour productivity and an 8 per cent increase in total factor productivity (the formulas describing these summary statistics are explained in Appendix C). An aggregate index of production-run lengths in manufacturing rises by 41 per cent. The welfare and income effects are also positive. The Canadian wage rises from 95 cents to $1.04, and GNE rises by 3.5 per cent. The welfare gain as measured by the Hicks equivalent variation is approximately $6.3 billion; on an initial GNE base of $153 billion this represents a welfare improvement of 4 per cent.[1]

The aggregate shift of economic activity between manufacturing and other industries is quite striking. Actual employment rises in manufacturing and falls in other sectors of the economy; this is contrary to the conventional pattern of adjustment to a tariff cut that comes out of the Heckscher-Ohlin

TABLE 9
Summary statistics (levels) - tariff cut experiment

Variable	All Tariffs In Place	UFT	MFT
Wage	0.94872	1.04343	1.18794
G.N.E.	153334.75801	158732.42391	172629.38829
G.N.P. (Real)	157183.73181	162675.12672	168216.26867
Capital Imports	2137.52954	6198.93359	14448.60547
Trade Volume	84827.78607	129907.05394	159989.25061
Intra-Industry Trade Index	0.59982	0.59563	0.58957
Total Value-Added	138621.18750	150758.00000	171323.62500
Value-Added (Mfg.)	35210.94704	40492.94653	44884.20579
Total Employment	85336.91500	85336.91500	85336.91500
Employment in Mfg	23149.48539	25117.47770	25858.55839
Fixed / Total Capital Ratio	0.19648	0.19610	0.15975
Government Revenue	16779.27136	14095.33519	15667.64081
Equivalent Variation		6334.74285	13174.76553
T.O.T for Economy	1.0889	1.0749	1.1146
T.O.T for Mfg.	1.0881	1.0629	1.0995
T.O.T for Primary	1.1061	1.1312	1.1819
Total Exports	43577.820	70701.067	87776.809
Total Imports	41249.992	59205.996	72212.441

Note: T.O.T refers to " terms of trade ". See Appendix C for the definitions of all the variables listed in this table.

TABLE 10
Summary aggregate statistics (changes)

Variable	UFT	MFT
D - Wage	0.0998212	0.2521437
D - GNE	0.0352018	0.1258333
D - GNP	0.0349362	0.0701888
D - Equiv. Var.	0.0413132	0.0859216
D - AGPRL	0.4139535	0.6683888
D - AGAFC	-0.1893172	-0.2994108
D - LPRCT	0.1956887	0.3261824
D - TFACT	0.0857589	0.0950260
D - TVOL	0.5314210	0.8860477
Lab.Realloc.Indx.	0.0393208	0.0615227
D - AGTRA	-0.0069868	-0.0170947

Note: The notation " D - ... " refers to the relative change in the variable under consideration. See Appendix C for the definition of each of the variables listed in this table.

TABLE 11
Production statistics - UFT

Industry	D-Output	D-Value-Added	D-Employment	D-Exports	D-Imports
1. Food and Beverage	0.1261	-0.1240	-0.0794	0.4383	0.5928
2. Tobacco	0.2831	-0.1680	-0.0620	1.0423	1.5697
3. Rubber and Plastic	0.3206	0.1663	0.1483	0.6618	0.6702
4. Leather	-0.1394	-0.2682	-0.2918	0.7230	0.4980
5. Textiles	0.1517	-0.0360	-0.0280	0.7685	0.6226
6. Knitting Mills	-0.2405	-0.4363	-0.4265	1.7564	0.8630
7. Clothing	-0.2277	-0.4389	-0.4634	3.4908	1.9309
8. Wood	0.1020	-0.0047	-0.0162	0.0681	0.2202
9. Furniture and Fixtures	-0.0907	-0.2185	-0.2465	0.8016	1.0540
10. Paper and Allied Products	0.1847	0.0686	0.0652	0.2070	0.3256
11. Printing and Publishing	0.0589	0.0033	-0.0451	0.1305	0.2916
12. Primary Metals	0.4285	0.3024	0.2842	0.4402	0.4518
13. Metal Fabricating	0.2094	0.0995	0.0598	0.4668	0.5055
14. Machinery	0.0541	-0.0044	-0.0609	0.2460	0.2156
15. Transportation Equipment	1.0553	0.8898	0.8032	1.3238	0.7681
16. Electrical Products	0.0580	-0.0446	-0.0819	0.3646	0.4280
17. Non-Metallic Mineral Production	0.1947	0.0832	0.0760	0.3682	0.3280
18. Petroleum and Coal	0.1182	0.1100	-0.0082	0.1902	0.1137
19. Chemical Products	0.1366	0.0438	0.0248	0.2586	0.2992
20. Misc. Manufacturing	-0.0044	-0.0994	-0.1397	-0.6500	0.4616
21. Agriculture	0.0479	0.0561	-0.0397	-0.0155	0.3287
22. Forestry	0.0955	0.1565	0.0516	-0.0288	0.1724
23. Fishing	0.0374	0.0683	-0.0287	-0.0132	0.0314
24. Mining	0.0507	0.0802	-0.0178	-0.0124	0.3159

25. Construction	0.0138	0.0427	-0.0520	-0.0547	0.1585
26. Transportation	0.0088	0.0565	-0.0394	-0.0882	0.2581
27. Communication	0.0085	0.0636	-0.0330	-0.1010	0.3219
28. Electric, Power and Gas	0.0716	0.0935	-0.0057	-0.0398	0.1308
29. Others	0.0296	0.0701	-0.0271	-0.1076	0.2688
30. Non-competing imports					0.0610

Note: The notation " D - ... " refers to the relative change in the variable under consideration.

Table 12
Production statistics - UFT

Industry	D-Lab. Prod.	D-Tot. Fact. Prod.	D-Capital/Lab Ratio
1. Food and Beverage	0.2233	0.0578	-0.2199
2. Tobacco	0.3680	0.0897	-0.4171
3. Rubber and Plastic	0.1501	0.0575	-0.2038
4. Leather	0.2152	0.0616	-0.2298
5. Textiles	0.1848	0.0674	-0.2066
6. Knitting Mills	0.3245	0.1084	-0.4144
7. Clothing	0.4393	0.1217	-0.5284
8. Wood	0.1202	0.0494	-0.1563
9. Furniture and Fixtures	0.2067	0.0653	-0.2452
10. Paper and Allied Products	0.1122	0.0548	-0.1168
11. Printing and Publishing	0.1088	0.0428	-0.1394
12. Primary Metals	0.1124	0.0418	-0.1161
13. Metal Fabricating	0.1411	0.0427	-0.1474
14. Machinery	0.1225	0.0269	-0.0779
15. Transportation Equipment	0.1398	0.0288	-0.0017
16. Electrical Products	0.1523	0.0455	-0.1338
17. Non-Metallic Mineral Production	0.1103	0.0568	-0.1153
18. Petroleum and Coal	0.1275	-0.0021	0.1284
19. Chemical Products	0.1090	0.0387	-0.0810
20. Misc. Manufacturing	0.1573	0.0457	-0.1903
21. Agriculture	0.0913	-0.0000	0.0998
22. Forestry	0.0418	0.0000	0.0998
23. Fishing	0.0681	-0.0000	0.0998

24. Mining	0.0698	0.0000	0.0998
25. Construction	0.0693	-0.0000	0.0998
26. Transportation	0.0502	0.0000	0.0998
27. Communication	0.0428	0.0000	0.0998
28. Electric, Power and Gas	0.0777	0.0000	0.0998
29. Others	0.0583	-0.0000	0.0998

Note: The notation " D - ... " refers to the relative change in the variable under consideration.

TABLE 13
Industrial efficiency indexes - UFT

Industry	D-Size of Prod. Run	D-Scale Elasticity	D-Fixed Cost	D-Markups
1. Food and Beverage	0.5682	-0.0664	-0.3445	-0.3510
2. Tobacco	1.3470	-0.1222	-0.5600	-0.5378
3. Rubber and Plastic	0.4445	-0.0515	-0.2834	-0.2778
4. Leather	1.5726	-0.0766	-0.5906	-0.5665
5. Textiles	1.5537	-0.0661	-0.5982	-0.5462
6. Knitting Mills	104.1048	-0.1268	-0.9900	-0.9506
7. Clothing	2.0519	-0.1214	-0.6468	-0.6269
8. Wood	0.3278	-0.0523	-0.2208	-0.2441
9. Furniture and Fixtures	1.0271	-0.0785	-0.4788	-0.4654
10. Paper and Allied Products	0.6930	-0.0554	-0.3988	-0.3905
11. Printing and Publishing	0.2885	-0.0447	-0.1880	-0.2076
12. Primary Metals	0.2585	-0.0309	-0.1908	-0.1892
13. Metal Fabricating	0.4815	-0.0508	-0.2963	-0.2994
14. Machinery	0.3320	-0.0327	-0.2134	-0.2181
15. Transportation Equipment	0.1418	-0.0126	-0.0909	-0.0599
16. Electrical Products	0.7069	-0.0590	-0.3876	-0.3850
17. Non-Metallic Mineral Production	0.2551	-0.0510	-0.1860	-0.1979
18. Petroleum and Coal	-0.0522	-0.0040	0.0623	-0.0410
19. Chemical Products	0.3405	-0.0360	-0.2418	-0.2338
20. Misc. Manufacturing	0.5820	-0.0519	-0.3342	-0.4053

Note: The notation "D - ..." refers to the relative change in the variable under consideration.

TABLE 14
Production statistics - MFT

Industry	D-Output	D-Value-Added	D-Employment	D-Exports	D-Imports
1. Food and Beverage	0.2907	-0.0463	-0.0538	1.1722	0.9593
2. Tobacco	0.3147	-0.1818	-0.1365	0.8963	2.2020
3. Rubber and Plastic	0.4276	0.2375	0.1270	1.0302	0.9296
4. Leather	-0.1314	-0.2685	-0.3601	0.7578	0.7770
5. Textiles	0.9417	0.6255	0.4925	6.4431	1.0916
6. Knitting Mills	0.0674	-0.2132	-0.2481	6.6563	1.3696
7. Clothing	0.6842	0.2186	0.0384	31.6460	2.6520
8. Wood	0.1189	-0.0302	-0.0932	-0.0549	0.4126
9. Furniture and Fixtures	-0.1837	-0.3015	-0.3914	0.4293	1.6815
10. Paper and Allied Products	0.9578	0.7849	0.6283	1.7060	0.7427
11. Printing and Publishing	0.3423	0.2782	0.1140	5.9964	0.6990
12. Primary Metals	0.3753	0.2069	0.1281	0.1127	0.5631
13. Metal Fabricating	0.2261	0.1051	-0.0264	0.3227	0.7505
14. Machinery	-0.0703	-0.1303	-0.2536	-0.0576	0.3816
15. Transportation Equipment	1.2184	0.9819	0.7627	1.5704	1.0033
16. Electrical Products	0.0190	-0.0816	-0.1991	0.2945	0.6677
17. Non-Metallic Mineral Production	0.2521	0.1128	0.0409	0.3548	0.5165
18. Petroleum and Coal	0.2596	0.1575	-0.0077	0.1058	0.3279
19. Chemical Products	0.2885	0.1590	0.0623	0.4086	0.6382
20. Misc. Manufacturing	-0.1046	-0.1993	-0.3047	0.3442	0.7485
21. Agriculture	0.6063	0.6760	0.3385	1.8706	0.6659
22. Forestry	0.3123	0.5073	0.2038	0.7714	0.5297
23. Fishing	0.3214	0.4450	0.1541	0.7286	0.4899
24. Mining	0.2846	0.3838	0.1051	0.4892	0.5004

25. Construction	0.0404	0.1430	-0.0872	-0.1715	0.6252
26. Transportation	0.0152	0.1467	-0.0842	-0.2162	0.4940
27. Communication	0.0237	0.1673	-0.0678	-0.2308	0.6227
28. Electric, Power and Gas	0.1728	0.2482	-0.0031	-0.1172	0.3714
29. Others	0.0623	0.1802	-0.0574	-0.2676	0.6900
30. Non-competing imports					0.2081

Note: The notation "D - ..." refers to the relative change in the variable under consideration.

TABLE 15
Production statistics - MFT

Industry	D-Lab. Prod.	D-Tot. Fact.	D-Capital/Lab.
1. Food and Beverage	0.3641	0.0820	-0.2746
2. Tobacco	0.5261	0.1130	-0.4880
3. Rubber and Plastic	0.2668	0.0941	-0.3038
4. Leather	0.3574	0.0924	-0.2876
5. Textiles	0.3010	0.0911	-0.2103
6. Knitting Mills	0.4196	0.1099	-0.3397
7. Clothing	0.6218	0.1573	-0.6588
8. Wood	0.2339	0.0932	-0.2785
9. Furniture and Fixtures	0.3411	0.0975	-0.3229
10. Paper and Allied Products	0.2024	0.0765	-0.0976
11. Printing and Publishing	0.2050	0.0812	-0.2579
12. Primary Metals	0.2192	0.0794	-0.2075
13. Metal Fabricating	0.2593	0.0710	-0.2124
14. Machinery	0.2455	0.0535	-0.1381
15. Transportation Equipment	0.2585	0.0505	0.0016
16. Electrical Products	0.2723	0.0725	-0.1638
17. Non-Metallic Mineral Production	0.2028	0.0953	-0.1710
18. Petroleum and Coal	0.2694	0.0108	0.1263
19. Chemical Products	0.2130	0.0669	-0.1060
20. Misc. Manufacturing	0.2879	0.0784	-0.2983
21. Agriculture	0.2001	-0.0000	0.2521
22. Forestry	0.0902	0.0000	0.2521
23. Fishing	0.1450	-0.0000	0.2521

24. Mining	0.1624	0.0000	0.2521
25. Construction	0.1397	-0.0000	0.2521
26. Transportation	0.1085	0.0000	0.2521
27. Communication	0.0981	0.0000	0.2521
28. Electric, Power and Gas	0.1765	0.0000	0.2521
29. Others	0.1270	-0.0000	0.2521

Note: The notation "D - ..." refers to the relative change in the variable under consideration.

TABLE 16
Industrial efficiency indexes - MFT

Industry	D-Size of Prod. Run	D-Scale Elasticity	D-Fixed Cost	D-Markups
1. Food and Beverage	0.8805	-0.0898	-0.4306	-0.4647
2. Tobacco	1.9804	-0.1469	-0.6368	-0.6325
3. Rubber and Plastic	0.8197	-0.0806	-0.4016	-0.4228
4. Leather	5.1360	-0.1103	-0.8152	-0.7911
5. Textiles	3.4420	-0.0877	-0.7601	-0.7098
6. Knitting Mills	1894.0728	-0.1282	-0.9994	-1.1475
7. Clothing	3.7536	-0.1478	-0.7482	-0.7455
8. Wood	0.7100	-0.0940	-0.3641	-0.4214
9. Furniture and Fixtures	2.2576	-0.1129	-0.6492	-0.6487
10. Paper and Allied Products	1.2266	-0.0781	-0.5306	-0.5389
11. Printing and Publishing	0.6236	-0.0836	-0.3122	-0.3742
12. Primary Metals	0.5384	-0.0577	-0.3198	-0.3451
13. Metal Fabricating	0.9865	-0.0823	-0.4424	-0.4706
14. Machinery	0.8145	-0.0637	-0.3824	-0.4130
15. Transportation Equipment	0.2565	-0.0256	-0.1278	-0.1194
16. Electrical Products	1.5610	-0.0913	-0.5649	-0.5785
17. Non-Metallic Mineral Production	0.4510	-0.0866	-0.2731	-0.3242
18. Petroleum and Coal	0.3503	-0.0091	-0.2466	0.0948
19. Chemical Products	0.7002	-0.0626	-0.3874	-0.3969
20. Misc. Manufacturing	1.3271	-0.0854	-0.5124	-0.6460

Note: The notation "D - ..." refers to the relative change in the variable under consideration.

model, and is much more like that proposed by Balassa who emphasized intra-industry adjustment. Indeed, the index of intra-industry trade hardly changes under UFT. Total value-added rises by about $12 billion, and of that the manufacturing sector gets about $5 billion, which is much more than its share, given that in the initial base equilibrium the value added in manufacturing is about 25 per cent of total value added.

The results indicate that there are some significant gains to be had from unilateral free trade, and furthermore that most of these gains accrue because of rationalization in the manufacturing sector. The impact of cutting domestic tariffs on the markups on cost in domestic industries is an important channel by which these rationalization benefits accrue. The average markup falls from 18 per cent in the initial equilibrium to 12 per cent with UFT. Another measure of the improvement in the efficiency of manufacturing is the change in the scale elasticity. It rises from an average of 0.85 to 0.90 - a significant increase. This rise in scale elasticity is quite significant and necessarily related to the fall in the markups.

UFT-industry results

Tables 11 through 13 reveal that the pattern of resource reallocation in the economy is much greater in the manufacturing industries than in the primary sectors. All primary industries expand in terms of gross output and value added under UFT. In the manufacturing sector, 75 per cent of the industries expand in terms of output. However, the change in relative factor prices through the rise in the Canadian wage causes the pattern of employment to adjust much differently. With the exception of forestry, all non-manufacturing industries experience a decline in employment. In the manufacturing sector, five of the twenty industries increase their employment of labour. Another distinguishing characteristic of the manufacturing sector is the relative magnitude of adjustment. In fourteen of the twenty manufacturing industries, output changes are more than 10 per cent; in the non-manufacturing sector, all output changes are less than 10 per cent.

The change in trade patterns is also quite interesting. In all manufacturing industries, exports and imports rise. Thus, some import substitution occurs, but at the same time all manufacturing industries increase their exports. In the initial, all-tariffs-in-place equilibrium, the net trade surplus in the non-manufacturing sector, excluding non-competing imports, is approx-

imately $6.25 billion. In the manufacturing sector plus non-competing imports, there is a deficit of $4.11 billion. Under UFT the surplus in the non-manufacturing sector falls to $3.18 billion, but the manufacturing sector, including non-competing imports, moves into a surplus position of approximately $3.02 billion. Thus, under UFT the trade surplus as a whole increases with an increase in capital imports, and both manufacturing and non-manufacturing sectors move into approximately equal positions in terms of their net trade surplus position.

The pattern of productivity changes fits well with the predictions of the industrial-organization view. Labour productivity improves in all industries, but the improvement is considerably more dramatic in the manufacturing industries. In all manufacturing industries labour productivity improves by more than 10 per cent; improvement ranges from a high of 43 per cent in clothing to a low of 10.8 per cent in printing and publishing. The source of these gains is made quite clear by an examination of the industrial structure results - a dramatic improvement in the length of production runs and consequent intersectoral shifts which were induced. This shows up in the allocation of capital in the economy. In the non-manufacturing sector the capital/labour ratio rose by approximately 10 per cent. This is explained simply by the rise in the Canadian wage. Given the rise in the output of these industries, this means that capital use increases absolutely in this sector. In manufacturing, however, the capital/labour ratio falls in all but one industry. This is the rationalization effect at work. Much of the capital in these industries is fixed capital; by rationalizing the amount of fixed capital per unit, output falls. This effect is so strong that the total capital/labour ratio in most manufacturing industries falls.

In understanding the industry results it is probably worth going through a couple of the cases in detail. Table 17 presents a list of 'winners and losers' on employment and value-added criteria. These lists are very arbitrary depending on the dividing line chosen to determine the winners and losers. They do give some indication, though, of the type of industries likely to benefit, and they provide a comparison with other policy experiments. On employment grounds, transportation equipment is the overwhelming winner under UFT, with an 80 per cent increase in employment. In the initial equilibrium, this industry has a wage bill of roughly $3 billion; with the increase in employment and the wage, under UFT this wage bill approximately doubles to about $6 billion. The results for this industry

TABLE 17
Winners and losers - UFT

Winners: Rank ordered on basis of value-added	Losers: Rank ordered on basis of value-added
Transportation Equipment	Clothing
Primary Metals	Knitting Mills
Rubber and Plastic	Leather
Forestry	Textiles
Petroleum and Coal	Tobacco
	Food and Beverages

Winners: Rank ordered by employment criterion	Losers: Rank ordered by emploment criterion
Transportation Equipment	Clothing
Primary Metals	Knitting Mills
Rubber and Plastic	Leather
	Furniture and Fixtures
	Misc. Manufacturing

Note: A winner on a particular basis is defined as as industry which has a ten percent or more increase in the particular variable. A loser is defined as an industry with a ten percent or more loss.

TABLE 18
Winners and losers - MFT

Winners: Rank ordered on basis of value-added	Losers: Rank ordered on basis of value-added
Transportation Equipment	Furniture and Fixtures
Paper and Allied Products	Leather
Agriculture	Knitting Mills (wiped out)
Textiles	Misc. Manufacturing
Forestry	Tobacco
Fishing	Machinery
Printing and Publishing	
Electric, Power and Gas	
Rubber and Plastic	
Clothing	
Primary Metals	
Others	
Communications	
Chemical Products	
Petroleum and Coal	
Construction	
Non-Metallic Mineral Production	
Metal Fabricating	

Winners: Rank ordered by employment criterion	Losers: Rank ordered by employment criterion
Transportation Equipment	Leather
Paper and Allied Products	Misc. Manufacturing
Textiles	Machinery
Agriculture	Knitting Mills (wiped out)
Forestry	
Fishing	
Primary Metals	
Printing and Publishing	
Mining	

Note: A winner on a particular basis is defined as as industry which has a ten percent or more increase in the particular variable. A loser is defined as an industry with a ten percent or more loss.

indicate the extreme importance of both general equilibrium and industrial-organization effects. Transportation equipment is subject to only a moderate tariff of 6 per cent in the initial equilibrium. But UFT leads to dramatic increases in output, employment, and exports. Why? Consider first the possibility for rationalization. In the initial equilibrium this industry has one of the highest fixed-to-variable cost ratios in the economy at 0.26. The scale elasticity at 0.79 indicates that scale economies are far from being exhausted. Both the export and import elasticities are quite high at about -3, suggesting that the industry could do quite well if it could get its price down. The rationalization process is quite strong in the industry. Markups fall by 6 per cent, and production runs increase by 14 per cent. Given the low initial scale elasticity, this leads to significant decreases in unit cost. The producers' price falls from 97 cents to 92 cents. The industry also benefits because the level of protection it was afforded initially is fairly low. Domestic consumers have higher incomes and face lower prices for transportation equipment; this leads to an increase in domestic final demand. Export demand increases, of course, because the prices charged to foreigners is lower and export demand in this industry is very price-elastic.

Now contrast this with a losing industry under UFT. The biggest loser is clothing, with a 46 per cent fall in employment and a 44 per cent fall in value added. This industry has virtually the worst of all possible characteristics from the point of view of surviving from import competition. The domestic tariff is extremely high at 32 per cent. There are some scale economies, but they are only moderate with a scale elasticity of about 0.89 in the initial equilibrium. On the other hand, the industry is very labour-intensive, which means that the rise in wages will affect its costs significantly. Indeed, rationalization does occur, with the production run more than doubling in size in the representative firm, and of course with a great deal of exit from the industry taking place. The rationalization is sufficiently great that the producers' price actually falls under UFT, even with the increase in the wage. However, import substitution kills the industry. The significant drop in foreign prices with the removal of the tariff changes the terms of trade within the industry significantly against domestic producers. Imports in quantity of base 1976 dollars go from $0.9 billion to $2.6 billion.

From this general discussion it should be clear what the general factors at work are. The factors which favour an industry's improvement under UFT include:

1 unexploited economies of scale
2 low levels of initial protection
3 a capital-intensive production technology
4 high export elasticities
5 moderate degrees of substitutability between the domestic and import-competing good.

A lack of all these characteristics spells general disaster for the industry.

Effective protection

It is interesting to investigate the concept of effective protection within GET. Economists often distinguish between effective and nominal protection to get at the problem of industries using high-cost intermediate inputs because of the tariff in other industries.[2] The usual definition of the level of effective protection afforded an industry by a nation's tariff structure is the percentage change in value-added per unit output as a result of the imposition of all domestic tariffs. In Table 19 effective and nominal tariffs are compared. Examination of the table reveals that all manufacturing industries are afforded positive levels of effective protection, and, with one exception (petroleum and coal), the level of effective protection exceeds nominal protection. Also, as is often thought to be the case, all non-manufacturing industries have negative effective protection rates. The correlation between effective and nominal tariffs is negligible, with a correlation coefficient of 0.016. The value of the effective protection concept seems doubtful however. It is commonly proposed as useful because of an assumed association between rates of effective protection and gross output changes. An examination of Table 19 reveals this not to be the case. For example, in most of the manufacturing industries which receive positive effective protection, the output changes are of the wrong sign, with output falling in response to the imposition of the tariff structure in industries receiving positive protection. This is clearly the result of rationalization; a tariff structure can raise value added per unit output but lower total output. This is achieved by simply having the firm produce high cost output, and hence high value-added per unit output, through a reduction of scale within the firm. These results suggest the concept of an effective tariff should be used with considerable caution when scale economies are significant.

TABLE 19
Effective and nominal tariffs and gross output changes

Industry	Effective Rates	Nominal Rates	D - Output
1. Food and Beverage	0.2855	0.1426	-0.1120
2. Tobacco	0.5422	0.3069	-0.2207
3. Rubber and Plastic	0.1323	0.0987	-0.2428
4. Leather	0.1761	0.1657	0.1620
5. Textiles	0.1947	0.1714	-0.1317
6. Knitting Mills	0.3475	0.3324	0.3166
7. Clothing	0.3765	0.3244	0.2948
8. Wood	0.1073	0.0627	-0.0926
9. Furniture and Fixtures	0.1635	0.1581	0.0998
10. Paper and Allied Products	0.1086	0.1005	-0.1559
11. Printing and Publishing	0.0554	0.0556	-0.0556
12. Primary Metals	0.0968	0.0557	-0.3000
13. Metal Fabricating	0.0999	0.0870	-0.1731
14. Machinery	0.0587	0.0502	-0.0513
15. Transportation Equipment	0.0876	0.0597	-0.5135
16. Electrical Products	0.1074	0.1038	-0.0548
17. Non-Metallic Mineral Production	0.1029	0.0757	-0.1630
18. Petroleum and Coal	0.0074	0.0278	-0.1057
19. Chemical Products	0.0889	0.0623	-0.1202
20. Misc. Manufacturing	0.1055	0.0908	0.0044
21. Agriculture	-0.0078	0.0662	-0.0457
22. Forestry	-0.0528	0.0037	-0.0872
23. Fishing	-0.0289	0.0048	-0.0361
24. Mining	-0.0273	0.1375	-0.0483

25. Construction	-0.0277	0.0000	-0.0136
26. Transportation	-0.0451	0.0494	-0.0087
27. Communication	-0.0518	0.0517	-0.0084
28. Electrical, Power and Gas	-0.0201	0.0001	-0.0668
29. Others	-0.0378	0.0109	-0.0288

Notes: The notation "D - Output" refers to the relative change in output.

MULTILATERAL FREE TRADE

In this section the results of the multilateral free trade policy simulation for the 'best guess' parameter values are presented. Multilateral free trade is compared with the all-tariffs-in-place equilibrium. Multilateral free trade involves the removal of both foreign and domestic tariffs. Foreign tariffs are listed in Table B2.A in Appendix B. They run from a high of 53 per cent on clothing and textiles to a low of zero on industries such as construction and services. The discussion in chapter 4 with regard to the distinction between tariff elasticities in export industries and price elasticities showed that these are not necessarily the same. An industry can have a significant tariff elasticity, and if the tariff is cut, the world demand for the product would rise significantly. But if the industry in question has a low share of the world export market and produces a fairly close substitute for other countries' exports, it will not benefit a great deal from the cut in foreign tariffs. The results of the MFT experiment are presented in Tables 9 and 10 and Tables 14 through 16. 'Winners and losers' from MFT are presented in Table 18.

MFT-aggregate results

The discussion is focused on the results in Tables 9 and 10. The major distinguishing features of the MFT experiment are the enormous increase in trade volume and the rise in real and dollar incomes of the labour force. Trade volume rises from approximately $84 billion in the base equilibrium to about $160 billion under multilateral free trade. GNE rises by about $20 billion with a rise in the wage from $0.95 to $1.19. Accompanying this is a rise in the trade surplus, and hence imports of capital services with balance-of-payments equilibrium, from $2.1 billion to $14.5 billion. It is quite clear that, under MFT, trade in goods and factors would be far greater than in the protection-ridden situation.

The welfare results are signficant. The real income gain to Canadians (measured by the Hicks equivalent variation) is about $13.2 billion, or 8.6 per cent of base GNE. These real income gains occur through a great deal of industry rationalization and through the resulting intersectoral shifts which occur from a comparative advantage viewpoint. The productivity and rationalization effects are most significant: aggregate output per person (labour

productivity) rises by 33 per cent! Total factor productivity rises by 10 per cent under MFT. The index of production run lengths rises by 67 per cent, and the use of fixed to total capital falls from 0.20 to 0.16.

The pattern of intersectoral shifts is again quite interesting, and as in the the UFT case quite the opposite of what a conventional comparative advantage view would give. On an aggregate basis, the total aggregate shifts are not enormous, but neither are they trivial. Six per cent of the labour force is reallocated intersectorally. On a trade basis the change in intra-industry trade is negligible, suggesting that the increase in trade volume is accounted for roughly by an equal increase in intra-industry trade and inter-industry trade. Looking at the economy from the manufacturing versus other perspective, the results are much like those of the UFT case, only larger in magnitude. Total employment in manufacturing rises by 12 per cent and of course falls in the non-manufacturing sector. The total increase in value added is about $33 billion, of which manufacturing gets about $9.7 billion. The trade position of the manufacturing sector changes dramatically. It goes from an initial deficit position of $4.1 billion to a surplus under MFT of $6.1 billion. This is approximately double the surplus it generates under UFT. The non-manufacturing sector goes from a surplus position of $6.3 billion to a surplus position of $8.4 billion. In terms of value added, this sector benefits significantly from MFT; but in terms of employment and its relative contribution to the trade surplus, its relative importance declines significantly. Indeed, one way to look at it is the ratio of trade surplus to total value added in each sector. Before protection is removed, this ratio is -0.12 in manufacturing and +0.06 in non-manufacturing. Under MFT, it becomes +0.14 in manufacturing and +0.07 in non-manufacturing. The change is clearly dramatic.

MFT-industry results

The industry results are given in Tables 14 through 16. Examination of these tables reveals a number of general features. Output rises in all but four manufacturing industries; the industries which contract under MFT are leather, furniture and fixtures, machinery, and miscellaneous manufacturing. On the trade side, exports rise in all but two manufacturing industries and in construction, communications, electric power and gas, and services. Imports rise in all commodity categories.

The production statistics show that labour productivity rises in all industries. The factor substitution effects are much like under the UFT case but more dramatic, given that the rise in the Canadian real wage is quantitatively greater. Capital/labour ratios rise in all non-manufacturing industries by 25 per cent. In manufacturing, the capital/labour ratios fall except in petroleum and coal.

The rationalization effects are quite strong. In all the manufacturing industries there is a rise in the scale elasticity, a fall in average fixed cost, and a fall in markups. It turns out that one industry, knitting mills, is all but wiped out.[3]

The winners and losers from MFT give results quite different than under the UFT experiment, given the same arbitrary cutoff point. In Table 18 the winners and losers from MFT on employment and value-added grounds are listed. Looking at the value-added results, the distinguishing feature of the results is the incredibly large number of winners. Eighteen out of the twenty-nine industries experience an increase of 10 per cent or more in their value added. This contrasts with only four winners under UFT. There are six losers by value-added criteria, the same number as in the UFT case. Again, the overall winner is transportation equipment both on employment and value-added grounds. The reasons transportation equipment is a winner are the same as under UFT. The losers, with one exception, have a common characteristic - very labour-intensive production technologies. The rise in the real wage clearly puts these industries at a great disadvantage relative to imports. The one industry which is an exception is tobacco, in which, while value added and employment decline, output and exports increase significantly, output by 32 per cent and exports by 90 per cent. On other criteria, this industry might be regarded as a winner. Clearly, it is an industry which has shifted to using relatively little labour and capital since it produces more output, yet has a smaller value added. The answer lies in the industry rationalization effect. A look at the increase in labour productivity, 52 per cent, demonstrates that the rationalization has been enormous. For example, output has gone up, yet the number of firms has been cut to twenty-five from an initial number of fifty-six. The initial scale elasticity in tobacco is 0.80; under MFT it rises to 0.92. The effect of opening up the industry to competition in both the foreign and domestic markets yields quite large benefits in terms of industrial efficiency. The tobacco example illustrates an important point. Picking winners and losers on the basis of conventional

criteria such as employment and value added is of considerable use. But it is important to keep in mind the total picture. In the process of moving to a free trade equilibrium there will be some dramatic intra-industry reorganization. The results clearly point to an improvement of productive efficiency within all industries. The intersectoral shifts, as discussed in chapter 2, are a major channel by which the benefits of these improvements of efficiency come about. Thus comparative advantage and rationalization become inseparable. The rationalization of the losers defined on an employment basis is an important part of the total resource reallocation picture. This is an important point to keep in mind when discussing possible policies to assist in the adjustment to free trade.

SENSITIVITY ANALYSIS

In this section, the results of parameter sensitivity analysis are reported on the basic model employed throughout this chapter. The results are summarized in Table 20. Three key parameter sensitivity experiments are considered. First, the import elasticities are varied. This is done by uniformly scaling them up and down by a factor of proportionality referred to as MSCAL. The higher the import elasticity, the more prone the domestic industries are to import competition. Furthermore, the import elasticity determines the extent to which foreign and domestic goods are viewed as substitutes. If these goods are highly substitutable, then it will also have the effect of raising the price elasticity of export demand, but not the foreign tariff elasticity. An example might be shoes. The world tariff on shoes might be quite high. A reduction in the foreign tariff might not lead to much increased demand for domestically produced shoes if shoes produced in Canada are close substitutes for shoes produced in Taiwan, given that Taiwan is the lower-cost producer.

The second parameter sensitivity study is on the export elasticities; these are all scaled up and down by a parameter called XSCAL. An increase in the export elasticity will increase both the price and foreign tariff elasticity of domestic export demand. The final sensitivity experiment is done on the economies of scale estimates; the adjustment parameter is referred to as NSCAL. Much of the interest in this study relates to the significance of scale economies for the results obtained.

The importance of these sensitivity studies is in establishing the robust-

TABLE 20
Sensitivity analysis results

Elasticity of exports scaling parameter XSCAL					
XSCAL	0.17	0.33	0.66	1.0	2.0
W	0.940	0.940	0.950	0.950	0.950
UFT:WG	0.043	0.042	0.042	0.041	0.040
D-W	0.105	0.104	0.100	0.100	0.950
D-TVOL	0.537	0.536	0.533	0.530	0.526
D-LPRCT	0.196	0.196	0.196	0.200	0.196
MFT:WG	0.049	0.055	0.069	0.086	0.170
D-W	0.125	0.146	0.190	0.250	0.530
D-TVOL	0.587	0.640	0.754	0.89	1.465
D-LPRCT	0.215	0.234	0.277	0.330	0.526

Elasticity of imports scaling parameter MSCAL					
MSCAL	0.33	0.66	1.0	1.33	1.66
W	0.94	0.93	0.95	0.97	0.99
UFT:WG	0.016	0.027	0.041	0.060	0.080
D-W	0.000	0.050	0.100	0.160	0.230
D-TVOL	0.122	0.290	0.530	0.820	1.110
D-LPRCT	0.056	0.049	0.200	0.300	0.410
MFT:WG	0.090	0.079	0.086	0.100	0.120
D-W	0.230	0.228	0.250	0.300	0.340
D-TVOL	0.551	0.680	0.890	1.142	1.400
D-LPRCT	0.238	0.062	0.330	0.416	0.515

	Minimum efficient scale scaling parameter NSCAL			
NSCAL	0.33	0.66	1.0	1.33
W	0.816	0.880	0.950	1.026
UFT:WG	0.025	0.032	0.041	0.054
D-W	0.043	0.068	0.100	0.140
D-TVOL	0.332	0.410	0.530	0.676
D-LPRCT	0.070	0.054	0.200	0.319
MFT:WG	0.610	0.071	0.086	0.108
D-W	0.181	0.209	0.250	0.314
D-TVOL	0.676	0.744	0.890	1.080
D-LPRCT	0.185	0.051	0.330	0.480

Note: W is the wage prevailing in the all tariffs in place equilibrium associated with each value of the scaling parameters. WG is the Hicks equivalent variation as a proportion of base GNE. D-W is the relative change in the wage. D-TVOL is the relative change in aggregate trade volume. D-LPRCT is the relative change in aggregate labour productivity. UFT and MFT refer to unilateral and multilateral free trade respectively. The changes reported in each column are relative to the all tariffs in place equilibrium computed at the value of the scaling parameter indicated holding the remaining two scaling parameters at their base values (one).

ness of the estimates obtained from the model and the likely range of values. As remarked in previous chapters the econometric estimates of elasticities and scale economies are known to be both biased and unreliable. It is of great importance then to know the sensitivity of results to the parameter values used. Fortunately GET is a reasonably computationally efficient model to use. This facilitates sensitivity analysis, a feature not characteristic of many of the large-scale models.

All parameter values in the base equilibrium correspond to the scaling parameter set equal to 1.0. The effect of changing import elasticities exhibits varying effects on the model. Letting MSCAL range from 0.33 to 1.33 gives the real income gains to UFT as ranging from 0.016 to 0.08 - quite significant changes. In the case of MFT, the real income gains range from 0.09 to 0.12. In this case there is actually a falling, then rising, effect; the lower gains to MFT occur in the base parameter value range. Trade volume responds significantly to varying these elasticities as one would expect. The productivity effects are also sensitive to these elasticities. For example, under UFT, the increase in labour productivity ranges from a low of 5.6 per cent to a high of 41 per cent. This is not surprising; import competition will lead to rationalization, the greater the extent to which foreign goods actually compete with the goods produced by the domestic industry. In summary: import elasticities appear relatively more important in determining the benefits to UFT than MFT. The gains to MFT for all import elasticities are 8.0 per cent or greater. The gains to UFT are positive for all ranges of import elasticities, but quite sensitive, ranging from no gains at low elasticities to gains as high as 8 per cent with very elastic import demands.

Changing export elasticities also has predictable consequences. The elasticities range from a low of one-third of the base elasticities to a high of twice the base elasticities. In the case of UFT, the welfare results are surprisingly insensitive. As the export elasticities increase, the welfare gain goes from 4.3 per cent to 4.0 per cent - a small decrease. However, in the case of MFT, there is a large change in the welfare gains, going from a low of 4.1 per cent to a high of 17 per cent. Particularly in the upper range of the export elasticities the welfare gains get extremely large. The industry results are not reported, but it turns out that for very high export elasticities the number of domestic industries which shut down gets larger. The rationalization effects become quite strong, and the economy moves to a more specialized pattern of production. Thus, export elasticities appear to be sig-

nificant in determining the gains to MFT and insignificant in determining the gains to UFT. For very low export elasticities, the gains to free trade are of the same order of magnitude as the gains to unilateral free trade.

The last set of sensitivity results reported concerns the economies-of-scale estimates. The base estimates were based midway between the econometric and average engineering estimates. There is great controversy as to the reliability of any of these estimates. The economies-of-scale estimates are varied from a low of one-third the base values to 1.33 times the base values by varying a parameter, NSCAL. Not surprisingly, the model exhibits considerable sensitivity to these estimates. For example, the trade volume and labour productivity effects for both the UFT and MFT experiments are extremely sensitive to the NSCAL parameter. Increasing economy-of-scale estimates raise both the trade volume and labour productivity effects. The welfare gain estimates are similarly sensitive. For UFT the welfare gain varies from a low of 2.5 per cent to a high of 5.4 per cent. For an MFT experiment the gain varies from 6.1 per cent to 10.8 per cent. For values not reported, as NSCAL increases even further, the gains continue to increase. It is also the case, however, that for both UFT and MFT, as NSCAL increases beyond 1.33, a number of domestic industries cease to operate. As in the case of high export elasticities, a move to free trade involves increased specialization within the manufacturing sector of the economy. Not surprisingly, it is the labour-intensive, low-scale economy industries which shut down. In summary, both UFT and MFT gains are sensitive to assumptions about the degree of scale economies in the industry, although in both cases they are positive and significantly so. Even extremely conservative estimates of scale economies yield gains to MFT of 6 per cent.

SELECTIVE TARIFF CUTS IN MANUFACTURING INDUSTRIES

In this section the impact of cutting the domestic tariff on one industry, leaving in place the level of protection elsewhere, is examined. The interest in this question is twofold, as was indicated in chapter 3. First, if one is searching for an optimal tariff, an industry-by-industry adjustment method may be a practical one to use. Complete tariff removal provides an indication of what the correct direction for a move towards the optimal tariff would be. The second reason is of more practical significance. If it has been decided that a move towards UFT or MFT is to be made, it is unlikely that all tariff

reductions will occur immediately. Rather, a staged approach to tariff reduction is more likely. One way in which tariff reductions could be staged is on an industry-by-industry basis. The idea is to remove tariffs on those industries earliest where the benefits are greatest and provide impetus for factor reallocation. In particular, the sensible thing is to remove tariffs on those industries for which employment expands, as opposed to eliminating employment. If labour adjustment is sluggish this should ease the adjustment. A conventional Heckscher-Ohlin view of import-competition would suggest that it is unlikely that tariff removal would be employment-creating. The results here suggest that this is incorrect because it ignores the possibility for rationalizing an industry by removing protection.

The results of selective tariff cuts by industry are summarized in Table 21. In twelve of the twenty industries, removal of the tariff is actually employment-creating. Furthermore, in each of these twelve industries the welfare effect is positive. It is also noteworthy that in each case the removal of the tariff leads to an increase in exports which is greater in percentage terms than the increase in imports. The industry that would probably rank first in a list of industries on which to remove the domestic tariff would be transportation equipment. There is a large welfare gain to removing the tariff on this industry because of the significant rationalization effect. There is also a substantial increase in the demand for labour in this industry as a result. There are three industries for which there is both a welfare cost to removing the tariff and a decrease in the industry demand for labour. These industries are leather, knitting mills, and clothing. Since these are traditionally thought of as the labour-intensive, high-cost, 'sunset' industries, why is there a welfare cost to cutting the tariff in these cases? The answer lies in the terms-of-trade effect discussed in chapter 2. The release of the labour force from these industries causes expansion in other industries. The expansion occurs without rationalization in the receiving sectors. The traditional production and consumption gains are offset by a deterioration in the terms of trade. It is worth noting that the welfare losses are in each of these cases extremely small. The results do suggest that tariff cuts should occur last in labour-intensive industries where a significant export potential is unlikely to develop. The usual caveat applies to these statements. A static model is being used to make statements about a dynamic process. There are well-known difficulties with this type of exercise.

TABLE 21
Selective tariff cuts - summary statistics

Industry	$EQV	D-P	D-L	D-X	D-M	D-LPR
Food and Beverage	1069.73	-0.07	-0.02	0.51	0.47	0.13
Tobacco	218.04	-0.14	0.0	1.13	1.39	0.26
Rubber and Plastic	172.41	-0.05	0.06	0.73	0.21	0.06
Leather	-11.17	-0.08	-0.21	0.91	0.40	0.12
Textiles	130.25	-0.08	0.03	0.88	0.30	0.09
Knitting Mills	-14.95	-0.12	-0.37	1.59	0.85	0.19
Clothing	-17.40	-0.13	-0.48	3.08	1.87	0.30
Wood	242.90	-0.03	0.08	0.20	0.12	0.03
Furniture and Fixtures	23.72	-0.06	-0.20	0.94	0.87	0.10
Paper and Allied Products	373.91	-0.04	0.16	0.31	0.21	0.04
Printing and Publishing	84.22	-0.03	0.00	0.32	0.15	0.03
Primary Metals	499.86	-0.03	0.18	0.57	0.11	0.03
Metal Fabricating	347.41	-0.04	0.04	0.69	0.21	0.06
Machinery	5.18	-0.03	0.02	0.44	0.10	0.03
Transportation Equipt.	2673.45	-0.04	0.53	0.95	0.62	0.13
Electrical Products	108.82	-0.05	-0.04	0.54	0.26	0.06
Non-Metallic Mineral Production	193.46	-0.04	0.10	0.56	0.11	0.04
Petroleum and Coal	94.63	-0.01	-0.01	0.06	0.07	0.01
Chemical Products	101.34	-0.03	0.04	0.42	0.14	0.03
Misc. Manufacturing	49.01	-0.04	-0.02	1.01	0.30	0.07

Note: $EQV is the Hicks equivalent variation welfare benefit measure measured in millions of 1976$. D-P is the relative change in the consumer price of the domestic good from the industry indicated in left hand column. D-E is relative change in labour employed in the industry. D-X is relative change in exports in the industry. D-M is relative change in imports in the industry. D-LPR is relative change in labour productivity in the industry. All changes relative to base, all tariffs in place equilibrium.

INCREASING PROTECTION

In order to get a broader picture on the effect of protection on the economy, two experiments involving increased protection were carried out on GET. The first involved raising domestic tariffs by 50 per cent from the initial base values, and the second involved raising foreign tariffs by 50 per cent. The most significant feature of the results was the rather small welfare losses generated in each case; in the case of raising foreign tariffs, the loss was about 1.1 per cent, and in the case of raising domestic tariffs, the loss was 2.0 per cent. These are the orders of magnitude one might expect to get from a Heckscher-Ohlin model. Raising tariff barriers beyond the initial levels does not significantly diminish the efficiency of the manufacturing sector relative to initial levels.

Other variables are affected more significantly, however. Trade volume in each case decreases significantly. Raising foreign tariffs by 50 per cent actually puts the economy in a permanent trade deficit position with domestic capital services going abroad. The wage in both cases falls to about 92 cents from an initial level of 95 cents.

GET WITH PRODUCT DIFFERENTIATION

The results reported thus far have not allowed for product differentiation. Product differentiation is incorporated in GET through the elasticities approach; in this approach, discussed in chapter 4, the elasticity of substitution determines not only relative own and cross-price elasticities of demand for pairs of goods, but it also determines the benefits of increased product diversity. In GET with product differentiation, the basic assumption is that each firm within each industry produces goods which are symmetric but imperfect substitutes for the goods of all other firms and for goods which are imported from abroad in the same commodity category. In general, the elasticities approach seems unsatisfactory as an approach to product differentiation. For example, for very small scale economy estimates, MFT gives large welfare benefits; these are derived not from industry rationalization but from the increased product diversity that small-scale economies and a large market give. On the other hand, for UFT in the same circumstances there is a welfare loss because of a reduction in product diversity forced by the exit of domestic firms upon removal of domestic tariff barriers. Alternatively, for

medium to moderate-scale economy estimates, the incorporation of product differentiation has a slight negative impact on rationalization. Indeed, for the base parameter values, the gains to MFT with competitive foreign product differentiation (defined in chapter 4) are 6 per cent, and for UFT 2 per cent. In each case the fact that these numbers are lower than without product differentiation can be traced to the negative impact that industry rationalization has on the number of firms.

Unfortunately, without some treatment of product differentiation the problem of horizontal integration of production within the plant cannot be investigated. The product differentiation model version of GET has these effects, but given the speculative nature of the product differentiation hypothesis, they must be interpreted cautiously. This is an area which remains on the future research agenda as an important unresolved problem.

6
Industrial policy evaluation

INTRODUCTION

In this chapter the effect of alternative industrial policies is considered within the context of the GET simulation model. The basic assumptions as to behaviour and parameter values that were used in the trade policy exercises are maintained.

The nature of the GET model is such that it provides an ideal tool for evaluating the long-run impact of alternative industrial policies in manufacturing industries. It is well suited to this type of exercise because it allows the interaction between industrial structure and behaviour and the general equilibrium nature of the economy to interact. All policies evaluated in this chapter are sectoral or industry policies; that is, they pertain to all firms within the industry in question. The impact of each policy is determined by comparing the equilibrium which is obtained with the policy in place to the long-run equilibrium without the policy. The reference equilibrium is the long-run equilibrium with all taxes and tariffs in place at the 1976 levels. Model parameter values are the reference 'best guess' parameter values used in chapter 5. Each policy is evaluated on an industry-by-industry basis. That is, the impact of a particular policy is considered, assuming that it is put in place on only one industry. No results are reported for introducing a policy on many sectors simultaneously.

Five types of policies are considered: a wage subsidy, a capital subsidy, import substitution, export promotion, and go-it-alone industry rationalization. The details of each policy will be given below. The results of each policy on each of the twenty manufacturing industries is available in

Appendix E. The purpose of this chapter will be not to discuss the specifics of various industries but to attempt to evaluate the general nature of the impact of alternative policies and to evaluate their effectiveness.

LABOUR SUBSIDY POLICIES

Labour subsidy policies are simulated by granting an industry a 10 per cent ad valorem subsidy on its wage costs. The major effect this has on the industry is to reduce its variable costs. The motivation for such policies is often to promote employment. Two interesting features of these policies emerge (Table 22). The first is the financial effectiveness of the policy. Define the employment multiplier as the change in the wage bill per dollar subsidy; the impact of the individual industry subsidy on the economy-wide wage is trivial, so the wage bill multiplier is the same as the employment multiplier. For most industries this multiplier is greater than one. On a financial basis such a policy may seem to be effective. However, the policy has quite a negative effect on the cost efficiency of the industry. The entry caused by the wage subsidy is not offset by an equal and offsetting increase in industry demand. The net effect is a reduction in production runs in the industry and a consequent increase in unit cost. Note that the welfare gain is uniformly negative, even though by assumption there are no deadweight costs associated with raising the revenue necessary for the subsidies. These losses are undoubtedly due to the efficiency losses in the industry in question and to the intersectoral efficiency losses from the traditional distortion between the marginal value product of labour in different industries.

CAPITAL SUBSIDY POLICIES

Capital subsidy policies are simulated by a 10 per cent subsidy to the firm on its capital payments. As discussed in chapter 3, a crucial effect in the analysis is that, to the extent that capital costs are fixed costs, the major effect could well be an entry effect with consequent efficiency losses and few offsetting benefits. This turns out to be the case. Results are summarized in Table 23. In each case the effect on industry output and price is negligible. All profits created by the capital subsidy are dissipated by entry in the long run. Productivity in the industry in all cases falls. The effect on exports is likewise insignificant. As remarked in chapter 4, the free-entry

TABLE 22
Employment subsidy - industry data

Industry	Welfare Gain	Subsidy Cost	Change in Wage Bill per $ Subsidy	Relative Change in Output	Relative Change in No. of Firms
1	-182.3147	280.7268	0.8706	0.0122	0.0664
2	-7.1410	17.9845	0.8671	0.0129	0.0761
3	-31.5594	76.3977	1.2416	0.0538	0.1549
4	-15.6210	21.9803	1.6587	0.1018	0.2948
5	-34.3266	65.4652	1.1664	0.0447	0.1866
6	-12.2489	19.1001	1.4374	0.0739	0.2561
7	-51.6734	106.2029	1.5489	0.0753	0.2348
8	-74.6338	142.9653	1.1523	0.0433	0.1234
9	-21.5818	56.7846	1.4069	0.0712	0.2274
10	-81.4376	178.1043	1.2751	0.0583	0.1618
11	-81.4277	152.7144	1.0444	0.0371	0.1614
12	-18.8742	178.7935	1.3718	0.0667	0.1367
13	-86.8529	263.1868	1.2757	0.0571	0.1846
14	20.3520	121.9563	2.0764	0.1597	0.3214
15	-125.9798	315.0723	1.0439	0.0426	0.0908
16	-46.9523	180.2524	1.4517	0.0791	0.2344
17	-45.0282	89.0473	1.0459	0.0381	0.1001
18	-13.9548	33.4211	0.9596	0.0030	0.0505
19	-45.9506	112.9356	1.1204	0.0383	0.1191
20	-9.3825	92.5598	1.9521	0.1406	0.3059

Note: The welfare gain is expressed as the Hicks equivalent variation welfare measure, measured in millions of 1976$. The subsidy cost is the dollar cost of the subsidy in millions of 1976$.

TABLE 23
Capital subsidy - industry data

Industry	Welfare Gain	Subsidy Cost	Change in Wage Bill per $ Subsidy	Relative Change in Output	Relative Change in No. of Firms
1	-296.5911	239.6166	0.2617	-0.0016	0.0767
2	-23.7142	12.4539	0.3252	-0.0001	0.0721
3	-36.6276	27.4565	0.3523	0.0000	0.0695
4	-31.2421	5.1037	0.7042	0.0122	0.0772
5	-227.1346	35.3427	0.2576	0.0123	0.1289
6	-35.7647	5.3151	0.5578	0.0113	0.0854
7	-15.5814	8.7831	0.7829	0.0000	0.0227
8	-83.2129	71.0558	0.3443	-0.0002	0.0700
9	-44.5918	11.7271	0.5932	0.0050	0.0572
10	-898.4712	142.7607	0.2773	0.0257	0.1627
11	-45.5241	37.4175	0.4544	-0.0002	0.0567
12	-145.7466	110.4696	0.1899	0.0006	0.0904
13	-295.0242	83.7670	0.4238	0.0046	0.0750
14	-125.4938	30.2893	0.7880	0.0149	0.0807
15	-365.3535	313.0667	0.3807	0.0001	0.0666
16	-301.2527	57.6331	0.5308	0.0120	0.0891
17	-79.0870	66.0037	0.2129	-0.0003	0.0848
18	-552.9050	73.2050	0.0276	0.0014	0.1705
19	-427.1433	91.8230	0.1761	0.0105	0.1248
20	-50.3939	17.8596	0.6943	0.0066	0.0606

Note: The welfare gain is expressed as the Hicks equivilent variation welfare measure, measured in millions of 1976$.The subsidy cost is the dollar cost of the subsidy in millions of 1976$.

assumption is crucial here. If barriers to entry existed, capital subsidies could conceivably have different effects. However, in a free-entry model it would be hard to find a policy with so few redeeming features.

IMPORT SUBSTITUTION POLICIES

The import substitution policy is simulated by considering a 50 per cent increase in the level of the domestic tariff from its base value. Such policies are often implemented with the objective of fostering the development of an industry based on infant-industry arguments, protecting employment in 'sunset' industries, or attempting to correct a perceived 'problem' in the industries' balance-of-trade position. Some summary statistics from these simulations are presented in Table 24. There are two immediate effects of raising the tariff wall in a particular industry. The one traditionally discussed is to force consumers of the foreign import good to substitute into the domestic good. Under the mixed-pricing hypothesis, however, there is the impact that raising the tariff has on markups in the industry. Following the Eastman-Stykolt hypothesis, the domestic prices are keyed to the import-competing price. The rise in the markups creates profits and encourages entry. This has a negative impact on industry rationalization. In looking across the industry results, it appears that both effects are present in GET. Imports rise and entry occurs. Generally the length of production runs falls and average costs of production rise. Consequently, the price of the domestic good rises more than it would have otherwise. In fifteen of the twenty manufacturing industries, output actually falls as a result of raising the tariff. The employment effects are quite mixed depending upon the importance of scale economies and the labour intensity of the industry. For example, in leather, knitting mills, and clothing, the import substitution policy has a significant employment-creating effect. In other capital-intensive, high-scale-economy industries such as transportation equipment, import substitution has strong negative effects on employment. The welfare effects are in all cases significantly negative.

To summarize: unless the policy is intended to create employment in labour-intensive, import-competing industries, import substitution policies do rather poorly in a static model. Clearly, the model does not capture the arguments used in the case of an infant industry. Import-substitution policies do particularly badly in those industries in which scale economies are

TABLE 24
Import substitution

	Welfare Gain	Relative Change in Imports	Relative Change in Wage Bill
Industry 1	-549.1855	-0.1561	0.0087
Industry 2	-97.9612	-0.2829	0.0057
Industry 3	-84.6808	-0.0829	-0.0154
Industry 4	-6.5063	-0.1560	0.1121
Industry 5	-100.7184	-0.1117	-0.0039
Industry 6	-40.3866	-0.2622	0.1757
Industry 7	-155.9821	-0.4215	0.1927
Industry 8	-118.2635	-0.0489	-0.0383
Industry 9	-39.1071	-0.2633	0.0761
Industry 10	-158.2236	-0.0828	-0.0657
Industry 11	-48.1028	-0.0618	-0.0004
Industry 12	-228.5033	-0.0462	-0.0694
Industry 13	-171.2362	-0.0854	-0.0099
Industry 14	-11.7331	-0.0486	0.0086
Industry 15	-908.5088	-0.1873	-0.1896
Industry 16	-83.5997	-0.1059	0.0296
Industry 17	-89.3423	-0.0465	-0.0382
Industry 18	-52.9825	-0.0305	0.0026
Industry 19	-61.2939	-0.0597	-0.0131
Industry 20	-37.6392	-0.1272	0.0430

Note: The subsidy cost is the dollar cost of the subsidy in millions of 1976$.

significant; the industry cost inefficiencies introduced are quite significant.

EXPORT PROMOTION POLICIES

The export promotion policy considered, only one of a range of subsidy programs which might be thought of as export-promoting, is an export subsidy, offered to foreign buyers only, as a percentage of the domestic producer price. The difference between this policy and other subsidy policies is that benefits accrue on impact to foreign buyers, and not to domestic firms. The adverse entry effect of a subsidy policy thus might be thought to be mitigated. The particular policy considered is a 25 per cent export subsidy. Some results are summarized in Table 25.

The impact of export promotion policies varies considerably across different industries. In the traditional import-competing, labour-intensive industries, the policy is of little use. In the industries attached to resource-processing activities, it is for the most part of negative value; export promotion encourages exports, but it also leads to an adverse entry effect and decreased cost efficiency. The industries where it appears to be of the most value is in machinery, metal fabricating, and transportation equipment. In each of these industries the export subsidy leads to increased welfare, increased employment, and improved cost-efficiency through longer production runs. These industries are all capital-intensive with significant scale economies. The most dramatic result is in the case of transportation equipment. A 25 per cent export subsidy pushes the model into a highly specialized pattern of production with a significant welfare gain. The economy devotes more than a quarter of its labour force to producing in this industry with the subsidy. The welfare gain is about 5 per cent of base GNE; this is quite large, given that the subsidy pertains to only one industry. These results cannot be taken seriously because of the assumption of no retaliation by foreigners. Also, the constant-elasticity form of the export demand curves is no longer plausible for changes of this order of magnitude. Normally these types of extremely large intersectoral shifts never occur in general equilibrium models. The introduction of scale economies changes the picture quite dramatically. It is apparent there are great benefits to intersectoral shifts leading to a more specialized pattern of production. The export subsidy policy in industries with significant scale economies is one way of encouraging such shifts if it could be done without provoking retaliation. It needs to be

TABLE 25
Export promotion

Industry	Welfare Gain	Subsidy Cost	Change in Wage Bill per $ Subsidy	Relative Change in Output	Relative Change in No. of Firms
1	-1503.6545	2410.2390	0.6306	0.5690	0.5572
2	-44.2248	86.4517	0.7800	0.4126	0.4031
3	-423.0571	2666.9602	1.1335	4.3352	4.3968
4	-21.4231	78.6111	1.4481	0.6087	0.6610
5	-145.2606	426.2822	1.1147	0.8029	0.8973
6	-8.1130	23.7534	1.2615	0.1784	0.2056
7	11.9712	423.3877	1.5839	0.7446	0.7152
8	-489.4587	3337.0459	0.9311	2.2918	2.2489
9	-12.6555	191.1783	1.5099	0.5838	0.5939
10	-1323.4922	4309.5625	0.9300	2.4205	2.5253
11	-23.4464	669.5674	1.6758	0.7949	0.8061
12	1325.4958	21600.6211	0.8792	10.7840	6.3609
13	47.2499	5044.2617	1.4395	2.9671	2.5295
14	257.3452	6774.3945	1.3879	9.1854	7.3459
15	8085.8190	137137.0140	0.4637	20.5310	6.2192
16	-236.2494	1348.9290	1.4258	1.2014	1.2277
17	-544.5540	2922.8081	1.0804	3.7886	3.7674
18	-584.3850	456.9292	0.1554	0.2246	0.3681
19	-839.9844	2816.9382	0.9019	2.4419	2.4768
20	-76.6273	4930.2344	1.4932	9.4663	7.7003

Note: The welfare gain is expressed as the Hicks equivilent variation welfare measure, measured in millions of 1976$. The subsidy cost is the dollar cost of the subsidy in millions of 1976$.

considered seriously as a viable policy option if free trade arrangements break down.

INDUSTRY RATIONALIZATION POLICIES

This section considers a class of policies motivated by a very direct concern with 'rationalizing' the industry through some type of mechanism which directly affects industry structure. This is a variant of the GIA policies discussed in chapter 3. The specific policy considered is one of compulsory merger of firms within the industry, such that the number of firms in an industry is exactly one-half that in the base equilibrium. The implication of restricting the number of firms is that rates of return in the industry will rise above normal so that some mechanism must be found to prevent entry. GET does not specify how such entry prevention would occur. Indeed, this would seem to be the most practical difficulty of any type of rationalization policy directed at encouraging concentration. Nevertheless, it is of some interest to see what results such a policy, were it implemented, could have.

Some results for forced rationalization, one industry at a time, are presented in Table 26. Looking at the industry results, the effect is remarkably uniform across all industries. In each case profits and welfare rise; the profit increase is greater than the welfare increase. Unit costs, markups, industry output, and exports do not change significantly. The length of the production run doubles, and fixed costs fall by 50 per cent. The capital/labour ratio in each industry falls, and there are some negative effects on employment. The welfare gain in each case is remarkably close to the domestic share of producer surplus created in the industry. Thus, while the welfare effects are positive in each case, the major beneficiaries of the policy are the owners of the firms in the industry who are protected from entry after the 'rationalization' has taken place.

The value of these policies seems questionable unless some mechanism could be had which promotes the transfer of these gains in producer surplus directly to reductions in prices paid by consumers. What is needed in a 'rationalization' program is not only some realization of scale economies but also some means of transferring these gains to domestic consumers. In general, domestic tariff cuts would seem to be a preferable mechanism to that considered here. Domestic tariff cuts have the advantage of rationalizing the industry and transferring the benefits to consumers through lower prices.

TABLE 26
Industry rationalization

	Welfare Gain	Relative Change in Exports	Relative Change in Labour Productivity
Industry 1	1179.7291	-0.0007	0.2057
Industry 2	55.1645	-0.0020	0.2074
Industry 3	138.8039	0.0004	0.1166
Industry 4	15.0954	0.0003	0.0960
Industry 5	78.4225	0.0001	0.0539
Industry 6	15.7797	0.0009	0.0852
Industry 7	93.2501	0.0032	0.2044
Industry 8	361.8523	0.0008	0.1619
Industry 9	54.9860	0.0010	0.1230
Industry 10	317.9746	-0.0007	0.0494
Industry 11	216.0264	0.0022	0.1254
Industry 12	500.8943	-0.0034	0.0807
Industry 13	365.4327	0.0027	0.1100
Industry 14	126.3468	0.0018	0.1069
Industry 15	1698.1289	0.0039	0.4716
Industry 16	197.2018	0.0014	0.0956
Industry 17	304.9918	-0.0011	0.1185
Industry 18	122.0919	-0.0005	0.0347
Industry 19	275.7234	-0.0016	0.0594
Industry 20	88.3803	0.0022	0.1184

Note: The welfare gain is expressed as the Hicks equivalent variation welfare measure, measured in millions of 1976$.

On the grounds of the industry's trade performance, domestic tariff cuts do much better as well. With straight rationalization, because there are no price cuts, little or no increase in exports occurs. But with domestic tariff cuts, many industries significantly increase their exports because they are forced to sell in world and domestic markets at lower prices. This leads to an improvement in the net trade deficit position of the industry.

POLICY EFFECTIVENESS

The obvious question is 'what is the intent of an industrial policy?' This is a difficult question. Often the objectives of the policymakers are not clearly stated, making it difficult to provide an evaluation. It is clear that in most circumstances an improvement in aggregate real income, or in aggregate social welfare void of any distributional considerations, is not the foremost objective in choosing these policies. Other objectives such as employment, elimination of a sectoral trade deficit, and promoting 'rationalization' or productivity improvement within a particular sector are often considered to be important. The distinction between means and ends becomes blurred in the analysis. The ultimate objective might be to cause change, or to prevent change, in the income distribution in particular ways. Nevertheless, the evaluation of policy is more likely to be determined in terms of visible and 'objectively measurable' criteria. In this chapter each of the policies is considered in terms of effectiveness indices. The index can be thought of as a cost/benefit ratio. The benefits are defined in terms of improvements in a particular economic variable. The three that are focused on are industry employment, the sectoral trade deficit, and industry productivity.

In each case the improvement in the criterion in question constitutes the 'output' or the benefits of the policy. What should enter on the cost side? A direct measure of cost is the financial resources required which are immediately evident in the case of subsidy policies. Such a measure is not an adequate measure of the true opportunity cost of the policy. An alternative is the measure of some forgone alternative generated by the policy. One obvious measure is the aggregate welfare or real income loss generated by the policy. This would constitute an acceptable definition of the forgone alternative in many instances. Aggregate real income losses generated by these policies are in aggregate terms often small; they measure the diffuse, society-wide cost of the policy. If the real income cost is actually a gain, then of

course one has the best of all possible situations; the policy succeeds in promoting the particular objective at hand, and there are only benefits and no costs. For some policies and some objectives this turns out to be the case. In most cases, however, the distortion introduced by the industrial policy costs society in terms of decreased real income. In order to compare policies, it is convenient to construct an index of effectiveness.

To illustrate these issues, consider the case of promoting employment in a particular industry, the infamous and mythical widget industry. Consider two policies: a wage subsidy program and an export subsidy program. How should these be compared in terms of their relative effectiveness in terms of generating employment? Suppose the wage subsidy program generates $100 of employment and has an aggregate real income cost of $50. We define the employment effectiveness index for a wage subsidy policy as the ratio of employment gains to real income cost, giving a number of 2.0. Thus, at the margin, for every dollar of real income forgone, two dollars of employment can be generated in the widget industry. If the export subsidy program gives an employment effectiveness index of 1.5, then we say that it is relatively less effective as an employment program than a wage subsidy program. In the case of subsidy programs, however, it is clearly a mistake to ignore completely the financial cost of the program, as administration of the program will certainly burn up some real resources. Formally speaking, this effect is not in the model. Nevertheless, for the purposes of comparison we assume that for every dollar of subsidy generated there is a 50 cent real income loss due to administrative costs incurred by all domestic parties to the transaction, and a correction for the deadweight losses incurred through the increase in government revenue required. This assumption is admittedly totally arbitrary, but if anything it is probably on the conservative side.[1]

Using this methodology, an effectiveness index is constructed for each of the three objectives and each of the five policies. The results are summarized in Tables 27, 28, and 29. A 10* in the table indicates that no tradeoff is involved. The policy both improves the particular objective and raises aggregate real income. The numbers across any given row indicate the relative effectiveness of alternative policies in a given industry. For example, in industry 1, with regard to the employment effectiveness of policies, it is apparent that a labour subsidy policy ranks highest, with an effectiveness ratio of 0.784. Thus, each dollar of real income forgone generates 78 cents worth of employment in the food and beverage industry.

TABLE 27
Employment effectiveness of alternative industrial policies

Industry	Labour Subsidies	Capital Subsidies	Import Substitution	Export Promotion	Industry Rationalization
1	0.784	0.164	0.050	0.545	0.379
2	1.018	0.144	0.010	0.810	0.541
3	1.422	0.205	-0.116	1.698	0.528
4	1.442	0.113	3.318	1.968	1.120
5	1.192	0.042	-0.009	1.376	0.394
6	1.325	0.082	0.751	1.576	0.858
7	1.637	0.367	1.153	3.450	1.712
8	1.170	0.218	-0.409	1.371	0.509
9	1.677	0.146	0.994	2.775	1.021
10	1.377	0.049	-0.652	1.094	0.240
11	1.054	0.282	-0.004	3.172	0.736
12	2.319	0.115	-0.461	1.404	0.243
13	1.570	0.119	-0.105	2.636	0.642
14	6.458	0.182	0.725	2.667	0.768
15	1.167	0.243	-0.572	0.381	0.555
16	1.970	0.102	0.574	2.109	0.707
17	1.088	0.133	-0.349	1.545	0.289
18	1.098	0.005	0.018	0.091	0.086
19	1.285	0.040	-0.210	1.114	0.213
20	3.381	0.220	0.893	2.662	0.930
Average	1.722	0.149	0.280	1.722	0.624
Standard deviation	1.220	0.087	0.875	.918	0.373

NOTE: See Notes for Tables 27-9 following Table 29.

TABLE 28
Trade effectiveness of alternative industrial policies

Industry	Labour Subsidies	Capital Subsidies	Import Substitution	Export Promotion	Industry Rationalization
1	0.329	0.013	-0.024	2.916	0.012
2	0.238	0.001	-0.105	3.260	0.003
3	1.251	0.006	0.082	5.800	0.004
4	1.178	0.117	9.815	4.401	10*
5	0.696	0.060	1.284	3.820	0.007
6	0.857	0.079	2.034	4.145	0.001
7	0.925	0.012	1.673	7.992	10*
8	1.048	0.003	-1.470	5.066	10*
9	1.088	0.084	2.077	6.585	10*
10	1.496	0.132	-1.824	4.059	0.010
11	0.349	0.003	0.147	6.958	10*
12	3.656	0.025	-1.744	8.516	0.019
13	1.126	0.084	0.141	7.573	0.003
14	8.433	0.268	9.594	7.595	0.005
15	2.181	0.046	-2.930	5.871	0.003
16	1.571	0.129	2.339	5.054	0.004
17	0.874	0.003	-0.875	5.505	0.004
18	0.162	0.014	-0.065	1.844	0.003
19	1.091	0.083	0.323	4.392	0.014
20	3.858	0.185	2.891	7.142	10*
Average	1.620	0.067	1.168	5.425	
Standard deviation	1.833	0.070	3.208	1.799	

NOTE: See Notes for Tables 27-9 following Table 29.

TABLE 29
Productivity effectiveness of alternative industrial policies

Industry	Labour Subsidies	Capital Subsidies	Import Substitution	Export Promotion	Industry Rationalization
1	-3.867	-1.054	-0.473	0.175	10*
2	-3.901	-0.684	-0.219	0.016	10*
3	-2.549	-0.669	-0.074	0.052	10*
4	-1.379	-0.100	-0.686	0.003	10*
5	-2.269	-0.036	-0.358	0.017	10*
6	-1.527	-0.074	-0.020	0.005	10*
7	-1.858	-0.839	-0.071	0.105	10*
8	-2.714	-0.853	-0.229	0.093	10*
9	-1.833	-0.211	-0.043	0.031	10*
10	-2.593	-0.021	-0.238	0.070	10*
11	-1.511	-0.668	-0.141	0.090	10*
12	-5.660	-0.541	-0.264	0.243	10*
13	-2.287	-0.234	-0.248	0.214	10*
14	10*	-0.189	-0.743	0.090	10*
15	-5.188	-1.868	-1.939	10*	10*
16	-2.201	-0.105	-0.288	0.075	10*
17	-2.745	-0.558	-0.227	0.061	10*
18	-18.810	-0.083	-0.058	0.009	10*
19	-3.538	-0.074	-0.490	0.063	10*
20	-2.855	-0.332	-0.215	0.063	10*
Average	-2.964	-0.460	-0.351	0.154	
Standard deviation	4.715	0.450	0.413	0.338	

NOTE: See Notes for Tables 27–9 following Table 29.

NOTE: TABLE 27

The employment effectiveness index for industry i and policy p is defined as:

$$E(i,p) = (LA(i,p) - LB(i,p)) / W(i,p)$$

where:

LB(i,p) is employment in industry i before policy p is implemented.
LA(i,p) is employment in industry i after policy p is implemented.
W(i,p) is the real resource cost of policy p applied to industry i defined as:

$$W(i,p) = -EV(i,p) + 0.5*SUBC(i,p)$$

where:

EV(i,p) is the Hicks equivalent variation welfare measure of the benefit of the introduction of policy p applied to industry i.
SUBC(i,p) is the dollar cost of the subsidy payment to industry i after policy p is implemented (if policy p does not involve a subsidy payment SUBC(i,p) equals zero).

In Tables 27 through 29 the above three indices are computed for each manufacturing industry after each of the policy experiments is undertaken. In the situations in which a welfare gain and an improvement in the policy criteria results, a 10* is substituted for the value of the index. This identifies situations in which there is no trade-off between aggregate real income and the policy objectives. At the bottom of each table the average and standard deviation of the value of the index across industries is computed for each policy (except for the trade and productivity effectiveness indices for the industrial rationalization experiments).

NOTE: TABLE 28

The trade effectiveness index for industry i and policy p is defined as:

$$T(i,p) = ((EA(i,p) - MA(i,p)) - (EB(i,p) - MB(i,p))) / W(i,p)$$

where:

EB(i,p) is exports of industry i before policy p is implemented.
MB(i,p) is imports of industry i before policy p is implemented.
EA(i,p) is exports of industry i after policy p is implemented.
MA(i,p) is imports of industry i after policy p is implemented.

NOTE: TABLE 29

The productivity effectiveness index for industry i and policy p is defined as:

$$R(i,p) = (DA(i,p) - DB(i,p)) * LB(i,p) / W(i,p)$$

where:

DB(i,p) is labour productivity in industry i before policy p is implemented.
DA(i,p) is labour productivity in industry i after policy p is implemented.

Looking down a given column provides a view of the relative efficiency of a particular policy across industries. Thus, for example, under labour subsidies, it is apparent that they are most effective in terms of generating employment in industry 14 with an effectiveness index of 6.46. It is doubtful that comparisons of other policies with industry rationalization are meaningful. As was remarked previously, rationalization is a policy that is difficult to think of in marginal terms. Many entries in the table indicate that industry rationalization involves no tradeoffs, with the exception of employment objectives. Consequently, at the level of the individual industry it is a highly desirable policy. How it might be implemented remains problematic.

Leaving aside industry rationalization, consider the effectiveness of the other policies. First, with respect to employment objectives, it is seen that labour subsidies come out first, on average, with an index of 1.7, followed closely by export promotion policies, with an index of 1.6. Import substitution policies are considerably less effective and often have adverse employment effects, as indicated by the negative entries.

Trade effectiveness is defined as the reduction in the sectoral trade deficit due to the imposition of the policy. Here it is seen that export promotion is clearly the winner, followed by labour subsidies. What is interesting is how badly import substitution does on average. This is a policy which is often thought of as being promoted with sectoral trade deficits in mind. It is clearly considerably less effective than export promotion in this area.

Productivity effectiveness is defined as the increased output, in value terms, obtainable with the initial industry labour force, given the improvement in labour productivity any particular policy has. With the exception of rationalization, all the policies in question lead to both a loss in welfare and decreased productivity.

FINANCIAL VERSUS TRUE COST EFFECTIVENESS OF POLICY

In the last section it was pointed out that in measuring the cost of any given program there is a distinction between the financial cost and the true resource cost as measured by the real income forgone. Using the same measure of benefits, the same policy can be viewed quite differently depending upon the definition of cost used. In many practical instances, of course, those responsible for the evaluation of a policy do not have at hand a general equilibrium model of the economy with which to evaluate true resource cost.

GET is ideally suited to such calculations, and so a comparison is easy to make.

In Table 30 a comparison is made of the effectiveness of labour subsidies in promoting employment in terms of true social cost only and in terms of financial cost only. This table reveals two distinguishing characteristics of the alternative effectiveness measures. First, the value of the true cost index is significantly greater than the financial cost index. The implication is that doing cost/benefit analysis of employment creation policies may be seriously misspecified using the financial cost of the program, and the bias is uniformly toward underestimation of the benefits relative to cost. The second feature of the table is that the ranking of industries is different between these indices. Under a true cost index the first four industries are 20, 12, 14, and 16. Using a financial cost index the first four industries are 14, 20, 4, and 7. This difference has serious implications for deciding how the marginal dollar of government expenditure is to be spent if industries are chosen as targets for a subsidy policy based on the relative effectiveness of that policy across industries.

The conclusion is clear. Doing a general equilibrium cost/benefit analysis will often lead to a significant difference in conclusions from doing a partial equilibrium analysis. Given that general equilibrium analysis is in principle the 'correct' method, it appears that agencies responsible for evaluating industrial policies would be well advised to develop methods of policy evaluation which incorporate general equilibrium evaluations of the cost of the policy.

TABLE 30
Alternative indexes of policy effectiveness for labour subsidy

	True Cost Effectiveness Index	Financial Cost Effectiveness Index
Industry 1	1.3882	0.9015
Industry 2	2.2999	0.9132
Industry 3	3.1422	1.2980
Industry 4	2.4569	1.7461
Industry 5	2.3291	1.2213
Industry 6	2.3580	1.5122
Industry 7	3.3183	1.6145
Industry 8	2.2914	1.1962
Industry 9	3.8828	1.4757
Industry 10	2.8819	1.3177
Industry 11	2.0416	1.0886
Industry 12	13.3001	1.4040
Industry 13	3.9497	1.3034
Industry 14	12.8912	2.1513
Industry 15	2.6270	1.0504
Industry 16	5.7531	1.4986
Industry 17	2.1633	1.0939
Industry 18	2.4131	1.0076
Industry 19	2.8631	1.1649
Industry 20	20.0604	2.0335

7
Conclusions and policy implications

The GET model, through a series of policy simulations, has provided insight into the impact of alternative trade and industrial policies. In this chapter a summary of the results is given and the policy conclusions which stem from these results are discussed.

First, some initial caveats and qualifications. The policy simulations were done on a data set reflecting the structure of the Canadian economy in the mid-1970s. There have been some obvious changes in the economy and in external circumstances since that period which render some of the detailed industry results suspect. Nevertheless, the overall picture would seem to remain intact. The analysis is entirely static and long-run. Thus, no account is taken of adjustment costs, technological change, or dynamic forms of competition thought by some observers to be particularly important in the 1980s. The emphasis is on conventional, comparative-advantage analysis with the additional inclusion of scale economies and pricing practices in imperfectly competitive industries. This allows an additional avenue for adjustment through intra-industry adjustment and rationalization, as well as through interindustry resource shifts. A final word of caution. The foreign sector is treated in the evaluation of alternative policies as passively responding to changes in Canadian exports, imports, and prices. Retaliatory foreign policies are not explicitly incorporated in the simulations. In the event that a domestic policy might provoke increased foreign protection, the results would undoubtedly change. This is particularly relevant when discussing industrial policies.

TRADE POLICY CONCLUSIONS AND RECOMMENDATIONS

Multilateral free trade (MFT)

Policy simulations that have been carried out strongly support the argument for the benefits to Canada of multilateral free trade. For a wide range of parameter values, the gain in Canadian real income to free trade from the initial 1976 levels of protection would be on the order of 8 to 10 per cent of GNP. The Canadian real wage would rise on the order of 20 to 25 per cent with gains in labour productivity of similar magnitudes. The pattern of adjustment to MFT would primarily be through intra-industry rationalization with improved cost efficiency in most manufacturing industries achieved through realization of the advantages of larger scale. Under MFT only the most labour-intensive sunset industries would lose. On an aggregate basis, approximately 6 per cent of the labour force would be required to shift inter-sectorally. Thus, the adjustment to free trade is not likely to be as great as has been suggested. Under MFT, employment would actually increase in the manufacturing sector, and the sector as a whole would move into a trade surplus position. The industrial base of the economy would significantly expand under free trade.

The results clearly support the view that Canada's best interests are served by promoting and fostering free trade by whatever means available. Ideally, this would be through multilateral negotiations under the GATT agreement, but in the event that these should fail, bilateral negotiations with the United States would be the next best alternative. The key to achieving benefits through MFT is rationalizing the domestic manufacturing sector. Having access to the large U.S. market is of unquestionable importance.

Unilateral free trade (UFT)

The policy simulations carried out on unilateral free trade suggest that the gains are more sensitive to parameter values but fall somewhere in the 2 to 5 per cent range. Only the most pessimistic of assumptions pertaining to export elasticities will drive these gains to zero. The major gains to UFT are through the rationalization of the manufacturing sector. Increased competition forces domestic industries to rationalize and achieve greater efficiency in production. The pattern of adjustment is much like that under MFT with the

share of total employment rising in the manufacturing sector under UFT. Within the manufacturing sector, however, some of the sunset and traditional industries decline significantly. Industries which are capital intensive and have significant scale economies do extremely well under UFT. An initial trade deficit in manufacturing moves into a surplus position under UFT, though not as dramatically as under MFT.

The results suggest that in the event of a failure of MFT, UFT should be considered as a realistic and viable policy option. The real income gains are significant enough to warrant undertaking the necessary adjustment. There are some common sense qualifications, however. Assuming that MFT has failed suggests that protection in foreign markets is expected to be a likely occurrence. Under UFT, a signficant portion of total employment will occur in export industries. These industries will be vulnerable to protection in foreign markets. Government contingency policies should be prepared which will mitigate these losses and provide some even-sharing of the costs across regions and industries should protection abroad occur.

INDUSTRIAL POLICIES

Industrial policies are quite popular in industrialized countries at present. In many cases these are seen either as necessary for economic development on grounds such as market failure or as a substitute for trade policy. Within GET it is possible to evaluate industrial policies which are motivated by an attempt to rationalize industry, realize the benefits of comparative advantage, or pursue other industry-specific goals. The incorporation of scale economies and of imperfect competition into the analytical framework yields some important quantitative insights as to the relative effectiveness of alternative industrial policies.

The interaction between trade and industrial policy cannot be emphasized enough. Industrial policies are a poor substitute for free trade. The results clearly suggest that much larger real income gains are available through trade liberalization policies. Industrial policy by any level of government constitutes interference in the international marketplace. Industrial policies of one sort or another might be suitable in the event that protection becomes the rule rather than the exception. In such an event an optimal response by various levels of government could involve implementing one or more of the policies discussed below. The purpose in examining these policies is to sug-

gest the likely effects they will have within a general equilibrium framework capturing the relevant features of the Canadian manufacturing sector.

Five forms of alternative industrial policy were considered and evaluated in terms of their overall effect and of their industry-specific effect on variables such as employment and productivity. The five policies considered were labour subsidies, capital subsidies, import substitution policies, direct export subsidies, and industry rationalization policies. The latter is meant to include any policy directed specifically at either forcing merger or removing barriers to monopolization within the industry.

Employment subsidies

The aggregate real income effect of these policies is negative. They generally serve to discourage rationalization and to promote cost inefficiency within an industry by promoting excessive entry. They are, however, the most effective policies at generating employment in most industries. 'Effective' is used in the sense of dollar employment generated per dollar of aggregate real income forgone. They are particularly effective in protecting employment in labour intensive, import-sensitive industries. On average, in manufacturing, one dollar of real income forgone through a wage subsidy program will generate 1.72 dollars of employment. Careful use of wage subsidies is called for in export industries since they violate GATT conventions regarding subsidies and are likely to lead to countervailing duties or to similar actions by the importing nation.

Capital subsidies

This is a common form of policy used in Canada and in many other countries. The simulation results suggest it would be difficult to find another policy with so few redeeming features. The aggregate real income effects are uniformly negative and often significantly so. They generally cause employment declines within an industry rather than employment increases. What is perhaps their worst feature is the significant deterioration in industry productivity that occurs. The major effect of these subsidies is to encourage entry into the industry by subsidizing the fixed capital costs associated with starting up a new firm. They have relatively little impact on the variable costs which determine the price set by the firm. The entry of new firms

merely shrinks the market size of all firms, and the production runs of each firm decline. Thus, the average costs of production increase, and the net effect is a significant decline in productivity within the industry. This type of effect is the dominant one in all industries. In summary, they are an extremely ineffective policy other than to promote the use of capital within the economy.

Import substitution policies

The effect of selectively raising tariff barriers on each manufacturing industry was examined. In general these policies do not have many desirable effects. Very often they actually shrink output and employment within an industry, contrary to conventional wisdom. The explanation lies in the high cost-price margins induced by high tariff walls. With scale economies and long-run free entry, these margins create profits which are dissipated by entry and shorter production runs; hence, lower productivity within the industry results. The welfare effects are usually negative and large relative to industry output. As an employment policy, import substitution appears to be far inferior to wage subsidies. Given that the industries which suffer from import competition are unlikely to be subject to the threat of foreign retaliation in the export market, the imposition of wage subsidies can be viewed primarily as a domestic policy within the GATT convention. It is recommended, therefore, that wage subsidy policies be used as an alternative to import substitution policies for the purposes of protecting employment in import-sensitive industries if protecting jobs in these industries is thought to be desirable.

The other purpose of import substitution policies is to improve an industry's trade balance. The concern with sectoral trade balance often seems far out of line with its importance; nevertheless, it is often cited as a 'problem', and import substitution is seen as one way out of the problem. The simulation results on GET suggest that this belief is not well founded. For many industries the deterioration in the cost position of the industry through the effect on scale economies of increased protection can lead to an increase in imports over exports. This effect is particularly pronounced in industries with large-scale economies. In summary, import substitution policies have few desirable characteristics, and clear alternatives exist for the goals they are directed to.

Export subsidies

Export subsidy policies in the form of direct ad valorem subsidies to foreign buyers were evaluated. This type of policy is specifically directed at the export market and avoids introducing distortions in the factor markets. The most dramatic effect this policy has is to increase exports and improve the industry's trade balance. This is true for all industries. It also has significant employment effectiveness, although not as great as direct wage subsidies do. For most cases, though, the aggregate welfare effects of the policy are negative, with some noted exceptions. In export-oriented industries with significant scale economies, export subsidies appear to yield positive welfare benefits through increased productivity gains achieved by longer production runs and rationalization within the industry. This is not the case in either the labour-intensive 'sunset industries' or industries which are primarily resource-processing industries. Thus, in industries such as metal fabricating and transportation equipment - both with some signficant scale economies - there appear to be potential benefits to using export subsidy policies. The policy must be used with considerable caution, however, given the risk of foreign retaliation.

Industry rationalization

The simulation results on these types of policies suggest that they can lead to welfare improvements through forced rationalization of the industry. In all cases they have the effect of lowering average costs of production through increased production runs. The policy has virtually no effect on the price paid by consumers of the product, and all welfare gains accrue in the form of higher profits to the producers remaining in the rationalized industry. On income distribution grounds these policies might be thought to be undesirable and cumbersome to implement, given that permanent entry barriers to the industry must be maintained. Selective tariff cuts are generally a superior instrument by which to achieve the same ends. Cutting protection promotes industry rationalization, yields benefits to consumers in the form of lower prices, and encourages exports. Consequently, in industries in which there are thought to be significant benefits to rationalizing the industry, a superior instrument is the removal of domestic protection.

CONCLUSION

Canada is a nation with its economic future tied to the development of a vigorous world trading system. It is a small open economy with a significant resource base and a manufacturing sector under considerable competitive pressure from abroad. Will the manufacturing sector disappear? The results of this study support the hypothesis that Canada's comparative advantage is not entirely geared toward natural resource extraction and processing. Under free trade, Canada would have a vigorous manufacturing sector with a significant export profile. The major effect of free trade would be higher real incomes for Canadian labour and lower prices for many imported and domestically produced goods.

The key to coming to this alternative view of resource allocation in the Canadian economy is the recognition of the importance of scale economies and imperfect competition within the manufacturing sector of a small open economy. This opens up significant channels for changes in factor productivity and for the determination of domestic prices which do not exist in traditional economic models based solely on comparative advantage principles. In particular, the possibility of intra-industry rationalization emerges as an important explanatory factor in the determination of production and trade patterns. Much of this study has been devoted to explaining this alternative paradigm and its empirical implications for Canada. It is safe to predict that, in future years, analysis of economic policy in Canada in relation to productivity, trade, and industry will be profoundly affected by this alternative view. Much remains to be done.

Notes

Chapter 1: Introduction

1 For an excellent discussion of the role of free trade in the Canadian economic union and its relation to the constitutional debate see Chrétien (1980), Courchene (1983), and Flatters and Lipsey (1981).
2 Some economists would argue differently. The combination of the National Energy Program and tax policy has the effect of pushing too many domestic resources into the primary sector relative to that which would be dictated by natural comparative advantage. See Melvin (1983).
3 The book by Clarkson (1982) makes excellent reading on this point.

Chapter 2: The costs of protection: theory and evidence

1 See Corden (1971) for an advanced discussion of the costs of protection and Magee (1980) for a readable elementary exposition.
2 Deaton and Muellbauer (1980, chap. 7) provide a summary of this literature and a bibliography.
3 There is usually a good deal of debate among economists as to whether such an assumption is warranted or not in the Canadian case. Applebaum and Kohli (1979) provide empirical evidence in favour of the hypothesis that the demand for Canadian exports is less than perfectly elastic, but Canada is a strict price-taker in its import market.
4 Indeed this has been found empirically (see Stern 1964). Some economists refer to the 'costs of protection' as the deadweight loss calculated under the assumption of no terms-of-trade change; others refer to the cost of protection as including both combined effects.
5 Young (1957) in an early study calculated the cash cost of the tariff to Canada.
6 The 'Harberger methodology' refers to the empirical technique summarized above and pioneered by Harberger (1954) in his study of the deadweight loss due to monopoly pricing in the United States economy.
7 See Diewert (1982) for a theoretical development of this approach in the open economy. It is primarily an extension of the Hotelling (1938)-Harberger (1971) general equilibrium approach.
8 Below we will examine the empirical results from some of these studies. Some of the relevant references include Evans (1972), Miller and Spencer (1977), Deardorff and Stern (1979) and Brown and Whalley (1980).

9 See Wonnacott (1975a) and the Economic Council of Canada (1975) for surveys of the literature up to the mid-1970s.
10 There are of course other reasons for imperfectly competitive markets. These all come under the general rubric of entry barriers following Bain's pioneering analysis. On entry barriers generally see Scherer (1980), while Green (1980) nicely summarizes Canadian industrial organization.
11 Some authors have gone even further and suggested that the same forces were responsible for the large amount of foreign direct investment in Canada. The argument was that basically it paid a foreign firm to set up a branch plant behind the tariff wall, even if scale economies could not be realized, rather than export the good to Canada and pay the duty. This argument was made by Brecher and Riesman (1957).
12 The important exceptions being the recent contributions of Brander (1981), Helpman (1981), and Krugman (1980a,b).
13 The evidence for and against the lack of price competition is well summarized in Scherer (1980, chaps. 5-8).
14 Unfortunately the textbooks in international trade are relatively silent on most of these issues. Some discussion can be found in Balassa (1967), Corden (1974), and Wonnacott (1975a).
15 Recall that this is a homogeneous-good case. If there is product differentiation in the industry there is not true excess capacity. Note that the term 'excess capacity' does not necessarily refer to idle capital; it should perhaps be more accurately referred to as suboptimal scale. Nevertheless, the 'excess capacity' terminology is widely used.
16 If p is price, mc is marginal cost, and n is the absolute value of the elasticity of perceived demand, the optimal pricing rule for the firm is given by the Lerner Formula: $(p - mc)/p = 1/n$.
17 It may, or may not, result in fewer firms. Generally the presumption is in favour of fewer firms given that imports increase; this does not necessarily happen, as will be demonstrated in chapter 5.
18 See Scherer (1978, 319-20) for a discussion of excess-capacity problems and their empirical relevance. Bain (1966) estimated that less than half of all manufacturing employees worked in plants of 'reasonably efficient scale' in Sweden, Canada, France, Japan, and Italy. This study is now dated.
19 Factor efficiency is defined simply as the ratio of output to inputs.
20 In an appropriately specified macroeconomic model the other source of adjustment is the exchange rate but even in the long run it must be set by its PPP value.
21 The classic references on the empirical relevance of intra-industry trade are Balassa (1967) and Grubel and Lloyd (1975).
22 Helpman (1981), Krugman (1980a), and Lancaster (1979) are the basic references.
23 See Scherer (1980, chap. 14) for a discussion of the industrial-organization views on product differentiation.
24 This issue is quite important since the Armington (1969) assumption is used so widely in empirical work on trade.
25 Snape (1977) seems to have been one of the first to make this observation.
26 Balassa has stressed this point a great deal in numerous writings.
27 Caves (1981) has emphasized this point.
28 These studies include Gorecki (1976b), Eastman and Stykolt (1967), Daly, Keys, and Spence (1968), Caves (1975), English (1964), Fuss and Gupta (1981), Caves, Porter, and Spence (1980), McFetridge (1973) and Jones et

al. (1973). There are undoubtedly others we have missed.

Chapter 3: Trade and industrial policy

1 Economics is filled with examples of the free-rider problem and they often serve as evidence in arguments for some form of collective action for the individuals involved. Well-known free-rider problems include the divergence between individual and community demands for public goods; the incentive for individual members of an oligopoly cartel to cheat on the agreement; and the common property problem involving resources such as fish stocks where the individual incentive for an extracting firm to harvest the resource exceeds the social incentive.

2 The literature on this set of issues is so extensive as to preclude any reasonable set of citations. Any textbook in its discussion of commercial policy will cite the traditional sources. In Canada the ECC document Looking Outward (1975) was basically addressed to examining these alternatives. Other relevant material of recent years includes Wonnacott (1975), Lazar (1981), Wonnacott and Wonnacott (1982), Dauphin (1978), the Senate Committee on Foreign Affairs (1982), and Britton and Gilmour (1978).

3 See Lipsey (1960) for a theoretical discussion in the traditional model and Wonnacott (1975) for a review of the relevant arguments in the Canadian-American case.

4 A bibliography on industrial strategy would be both long and outdated by the time this book is in print. Davenport et al. (1982) contains a bibliography pertinent to the Canadian discussion.

5 This process is often referred to as the 'Dutch Disease.' See Cordon and Neary (1982) and Buiter and Purvis (1982) for a discussion.

6 See Lazar (1981) for a summary discussion on the increasing importance of non-tariff barriers.

7 Prominent recent cases include the Bombardier sale of subway cars to New York City and Canadian lumber sales in the United States. In both cases it was charged that subsidies were involved, and thus the possibility that countervailing duties could be levied was raised.

8 See Wonnacott (1975b) for a discussion of some of these.

9 There is a transfer from taxpayers to the owners of the subsidized firms. This transfer could involve a deadweight loss if it must be raised through distortionary taxation. Usher (1982) estimates these costs to be quite significant.

10 The details of this argument are quite subtle. See Brander and Spencer (1982) and Harris (1982).

11 Given that we can examine export subsidies it is a simple matter to consider export taxes. Given that the economy is presumed to face less than perfectly elastic demand for its export curves, this might well be an optimal policy, particularly if the industry lacks the necessary degree of cartelization to set the monopoly price. The government sets the optimal export tax in order to achieve the monopoly result and maximizes rents accruing to domestic firms. Again, barriers to entry are important for this type of policy to work. Space precludes us from considering this type of policy in detail.

Chapter 4: A general equilibrium approach to trade and industrial organization

1 These estimates are actually those of Fuss and Gupta (1981). See Appen-

dix A for the details.

2 The same type of example can be used to show that aggregation with increasing costs leads to an understatement of true cost increases.

3 The rationale of this assumption is based on the empirical evidence of numerous studies. For example see Appelbaum and Kohli (1979) and the references therein. It also conforms well with common sense. From a world perspective Canada may be a small open economy, but as most Canadian trade is with the United States, an important factor in the elasticity for demand for exports is the Canadian share of the U.S. market. This is often quite large in many cases.

4 See Krugman's papers (1980a,b) and (1981) for applications in the area of international trade theory.

5 For a criticism of the elasticities approach see Archibald, Eaton, and Lipsey (1982).

6 In most plants there is a production period, endogenously chosen, and a number of product changeovers, together with lengths of production runs, all choice variables on each product. Alchian (1959) emphasized the tradeoffs between these different choice variables within the firm. In GET the production period is the same as the basic economic period over which all flows are measured; it is not a choice variable. Secondly, the cost function does not distinguish between plants which undertake their production of alternative products sequentially, one after another throughout the period, and plants which simultaneously produce all products. Clearly in practice there are important differences in alternative methods of organization.

7 On the formal definition and implications of economies of scope, see Panzar and Willig (1981).

8 It would be important if interested in the incidence of the costs of protection across different income classes. This could be a potentially important extension of the model.

9 We require this because this is approximately the absolute value of the own price elasticity of demand for an individual product in category i. With a Cobb-Douglas specification the own price elasticity for a commodity aggregate is -1. Aggregating goods into a particular category only makes sense if they can be viewed as closer substitutes within a category than between categories.

10 Consider a simple, closed, one-industry economy with $C = n^{1/\rho}x$ where x is the amount of the representative good consumed, with $\sigma > 1$ or $\rho < 1$. Assume all goods cost \$1.00 per unit and the consumer has \$10.00 in income; suppose he were free to choose n and x. His problem would be

$$\text{Maximize } n^{1/\rho}x \text{ subject to } nx = 10.$$

It is clear the 'solution' to this problem is to let n be as large as possible and x as small as possible (i.e. unbounded variety). What prevents this from happening, of course, is that many products are not available, or from the consumer's view they have an infinite price. This utility specification does imply that any good produced at whatever price will have some demand.

11 If $F = wf_L + rf_k + (wh_L + rh_k)f(k)$ then $L_D = h_L\, f(k)$, $L_P = f_L$ and $P/D = (wh_L + rh_k)f(k)/(wf_L + rf_k)$. Thus

$$L_P/L_D - \frac{P}{D} = f(k)(h_L/f_L) - (wh_L + rh_k)/(wf_L + rf_k).$$

Let $\Theta = h_k/h_L = f_k/f_L$, the common fixed-capital/fixed-labour ratio. Then

$$\frac{h_L}{f_L} - \frac{wh_L + r\Theta h_L}{wf_L + r\Theta \tau_L} = \frac{h_L}{f_L}\left[1 - \frac{w + r\Theta}{w + r\Theta}\right] = 0.$$

Thus $L_P/L_D - P/D = 0$, and $dk^*/dw = 0$.

12 $\eta_x(y)$ denotes the elasticity of y with respect to a change in x.

13 See Arrow and Hahn (1971) for a discussion of non-uniqueness.

Chapter 5: Trade policy experiments

1 The Hicks equivalent variation is defined as the amount of income that would have to be taken away from people after the tariff removal so that they were as well off as in the initial situation, facing the prices prevailing in the initial situation. See Appendix A for further details.

2 See Corden (1971) for an extensive exposition of the concept of effective protection and its interpretations.

3 Formally the algorithm leaves one firm in the industry and allows it to run at a loss; in the case of knitting mills the loss is $11 million on sales of $450 million. One could check that the industry would actually shut down by restarting the algorithm excluding the domestic industry and then checking that it would not pay to start up that industry at the prevailing prices. Doing this makes little difference to the results. The firm-level statistics reported for knitting mills clearly are not meaningful because of the procedure adopted.

Chapter 6: Industrial policy evaluation

1 Usher (1982) provides estimates for both costs. He finds them to be large and significantly greater in total than 50 cents on the dollar.

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Appendix A
Data sources and model parameterization

INTRODUCTION

The aim of this appendix is to present the methodology used to choose the parameter values of the model as well as the sources of the data collected. The procedure used to calibrate the model is typical of that used in applied general equilibrium analysis. A data set is constructed for a particular year which the model is assumed to replicate as an equilibrium outcome. Heavy reliance is placed on the equilibrium concept as a source of identifying restrictions on the model. Values of the parameters of the model must be chosen in a manner consistent with the model reproducing the base year data set as a benchmark equilibrium. Depending on the functional form of the underlying utility and production functions many of the parameters of the model can be identified directly from the observed data. For example, the share parameters of the Cobb-Douglas utility function can be identified from the consumer's observed budget shares. Other functional forms such as the CES require specification of elasticities of substitution which cannot be identified from the benchmark data set and hence empirical estimates are sought in the existing literature. For some key parameters in the model no empirical estimates are available. In this case resort is made to 'sensitivity analysis' in which a number of plausible parameter values are considered.

The data set is constructed for the year 1976 as this was the latest year in which the input-output data were available when the project began. In some cases, particularly that of the published input-output tables, the data are not directly in a form consistent with the model, in which case they must be manipulated into a model-equivalent form. The construction of the bench-

mark data set is outlined below.

INPUT-OUTPUT FLOWS

An outline of the input-output flows to be constructed is presented in Table A.1. Each of the blocks represent a matrix or vector showing the value of commodity flows from one sector of the economy to another. Before describing the actual construction of the input-output tables a brief explanation of the nature of the flows within each of the blocks will be provided.

The Canadian economy is aggregated into twenty-nine industries. The first three blocks represent the use of commodities as intermediate goods by domestic industries. The first block shows the flow of output amongst domestic industries. That is an element of the 29-by-29 matrix that shows the value of industry j's output used as an input by industry i. An element of the second matrix of dimension 29 by 29 represents the value of commodity j imported which is used by industry i. Block three is a 29-by-1 vector showing the use of the commodity 'non-competing imports' by each of the domestic industries. The term non-competing imports refers to commodities which have no observed Canadian counterpart.

The value of payments to primary factors by each of the twenty-nine industries is represented by block four. Block four records the factor payments to capital and labour in each industry and in the case of the twenty non-competitive industries includes possible short-run economic profits or losses.

Blocks five through eight represent the demand for commodities for final demand purposes or for export. Blocks five and six are 29-by-1 vectors representing the final demand for domestically produced commodity j and imported commodity j respectively. Block seven is a scalar showing the final demand for the commodity non-competing imports. The eighth block is a 29-by-1 vector representing the exports of each domestically produced good. Finally, block nine represents the payments made to primary factors by final demand categories. The main source of final demand for primary factors is the government sector. For example, the wages and salaries of public employees are recorded here. In the model it is assumed that the demand for primary factors for purposes of final demand is exogenous. In this case the capital and labour employed in the public sector in the benchmark equilibrium is assumed not to be available for use in the private sector when counter-

TABLE A.1

	Output of domestic industry	Imported inputs	Non-competing imports	Primary inputs
Inputs of domestic industry	1	2	3	4
Final demand	5	6	7	9
Exports	8			

factual experiments are performed.

The value of domestic output produced by each industry is obtained by summing the appropriate columns of the domestic input-output matrix (block 1) and adding the value of final demand and exports for that industry's output. The value of total industry input payments is obtained by summing the rows of blocks one through four. The basic accounting identity of the system is that the total value of output for each industry equals the value of input payments.

The source for the construction of the input-output tables outlined above is Statistics Canada, The Input-Output Structure of the Canadian Economy 1971-1976 (15-201E), 1980, Tables 50, 51, and 52. The tables at the M level of aggregation for the year 1976 provide the basic data. In the published tables the inputs and outputs of each industry are classified by commodity with the number of commodities exceeding the number of industries. This framework requires the presentation of three tables to describe the commodity flows within the economy: the 'Make' matrix illustrates the value of commodity outputs by industry, the 'Use' matrix illustrates the value of intermediate commodity inputs as well as primary inputs, and the 'Final Demand' matrix shows the disposition of commodities amongst a number of final demand uses. Since the data presented in this manner do not conform to the structure of the input-output flows sketched in Table A.1, an outline of the assumptions and procedures used to transform the data into a model equivalent form will be presented.

The model presumes the input-output flows are on an interindustry basis, that is, showing the flow of aggregate industry output between industries and to final demand. In order to transform the published tables into

this format an assumption must be made about the allocation of commodity production amongst industries. The assumption made in this regard is that industries will preserve their observed market share of domestic commodity production regardless of the level of commodity production. The second manner in which the input-output tables required by the model differ from the published tables is in their separation of demand by each sector into separate demands for domestically produced goods and their imported counterparts. In the published tables, commodity flows disaggregated in this manner are not available. Demand by each sector represents the demand for output form both sources with information provided only on the total imports by all sectors. Given the lack of information about the import content of each element of demand the assumption is made that for each commodity the proportion of total demand supplied by imports is the same as the ratio of the value of imports to total domestic demand for that commodity. For further discussion of these assumptions, the reader is referred to the exposition accompanying the published Statistics Canada input-output tables.

The manner in which these two assumptions are used in the construction of the model equivalent input-output tables is presented below. The notation used in the algebraic operations is as follows:

D: a 43-by-92 market share matrix, derived from the Make matrix, which indicates for each commodity the proportion of total domestic output produced by each industry.

U: a 92-by-92 diagonal matrix where the diagonal elements U_{ii} represent the ratio of imports to total domestic demand.

B: 92-by-43 matrix where each element b_{ij} represents the value of input use of commodity i by industry j.

C: 92-by-1 vector of final demand for each commodity obtained by aggregating the final demand categories of consumption, investment and government expenditure.

E: 92-by-1 vector of exports by commodity.

I: 92-by-92 identity matrix.

The following matrix operations were performed.

1. Interindustry flows

Domestic input matrix: $D \cdot (I-U) \cdot B$

Import input matrix: $D \cdot U \cdot B$

2. Final demands

Domestic final demand: $D \cdot (I-U) \cdot C$

Import final demand: $D \cdot U \cdot C$

3. Exports

$D \cdot E$

The interpretation of these operations is as follows. Each row of the matrix product $D \cdot (I-U)$ represents the proportion of total supply, both domestically produced and imported, of each commodity accounted for by the production of a given industry. Pre-multiplication of the input matrix B and the final demand vector C then yields the demand for domestic industry output by intermediate and final demand categories respectively. An analogous explanation applies to the derivation of the demand for imports by intermediate and final demand categories. In this case the input matrix and the final demand vector are pre-multiplied by the matrix product $D \cdot U$ where the rows of $D \cdot U$ represent the share of imports in the total supply of each commodity by each industry. Since exports are domestically produced, pre-multiplication of the vector of exports E by the domestic market share matrix D yields a vector of exports by industry.

All of the matrices and vectors computed above correspond to a forty-three-industry level of aggregation. In order to reduce these to the required twenty-nine-industry level used in the model a number of industries are aggregated together. The four mining industries distinguished at the M level of aggregation - metal mines, mineral fuels, non-metal mines and quarries, and services incidental to mining - were aggregated into a single industry referred to as mining. In addition, industries numbered thirty-two through forty-three, primarily service industries and margins, were aggregated to form the industry, 'others' (industry twenty-nine). On the basis of this twenty-nine-industry level aggregation, the computed matrices and vectors were reduced to the dimensions twenty-nine by twenty-nine and twenty-nine by one respectively by the addition of the appropriate rows and columns.

The observed input-output co-efficients in the benchmark equilibrium are presented in Appendix B.

Appendix A

NON-COMPETING IMPORTS

The commodity non-competing imports are the aggregate of commodities ninety-three and ninety-four in the published tables, non-competing imports and unallocated exports and imports respectively. The flow of non-competing imports to each of forty-three industries was reduced to a twenty-nine-by-one vector by aggregating the appropriate industry values. The final demand for non-competing imports was obtained by adding flows across the various final demand categories.

PRIMARY INPUTS

The published input-output tables classify payments to primary factors according to the three categories - labour income, net income to unincorporated business, and other operating surplus. In addition, there are two categories, indirect taxes paid and subsidies received, which will be discussed below. Surplus which is computed residually in the tables includes among its components returns to capital, capital consumption allowances, and possible economic profits. In order to allocate these payments to the categories in the model - return to labour, return to capital, and economic profits - a number of steps were taken which are outlined below.

The first step is to allocate income accruing to unincorporated enterprises between the categories of labour income and surplus. Some proportion of the total income accruing to the unincorporated entrepreneurs can be regarded as a payment for their labour services while the balance can be regarded as their 'surplus.' The simplifying assumption is made that the proportion of the entrepreneur's income which applies to each category is the same as the observed proportion which accrues to labour and 'surplus' in the industry in which he operates. That is, for each industry the ratio of labour income to the sum of labour income plus surplus is computed and multiplied by the net income of unincorporated business to arrive at the labour income of entrepreneurs. The imputed labour income of entrepreneurs is then added to the value of labour income in the published input-output tables to arrive at total labour income.

The second step is the decomposition of 'surplus' into a return-to-capital component and an economic-profit component. Each of the competitive industries in the model are assumed in the benchmark equilibrium to be in a posi-

tion of long-run competitive equilibrium, in which case no economic profits are being earned. For each of these industries the income category surplus is regarded solely as a return to capital. The manufacturing industries, by contrast, are assumed in the benchmark equilibrium to be in a state of only short-run equilibrium, in which case firms may be earning economic profits or losses. In order to separate 'surplus' into its return-to-capital and economic-profit components in these industries, an independent measure of capital income was computed with economic profits being defined as the difference between 'surplus' and capital income.

In order to compute capital income in each manufacturing industry data on the capital stock existing in each industry was obtained from Statistics Canada, Fixed Capital Flows and Stocks 1972-1979 (13-211), 1979, Section 1. On the assumption that the flow of capital services is proportional to the stock, the value of the flow of capital services in each of the manufacturing industries was obtained by multiplying the capital stock by the rental rate of capital services.

FIXED CAPITAL AND LABOUR COSTS

In the model the total costs of the manufacturing firms are assumed to include both fixed and variable cost components. The payments to labour derived from the input-output tables and the payments to capital imputed from the capital stock data provide information only on the total primary factor costs of the firm. In this section the procedure used to apportion the primary factor costs of the firm between fixed and variable components is outlined.

In the absence of empirical estimates of the fixed costs incurred by manufacturing firms a cost function is postulated, and values of fixed capital and labour costs are identified which are consistent with the assumed cost function. The assumed functional form of the cost function C is:

$$C(w, r, q, y) = h(w, r, q) \cdot y + r\bar{K} + w\bar{L}, \tag{A.1}$$

where y represents output, $\bar{K}$ is the fixed capital requirement, $\bar{L}$ is the fixed labour requirement, r is the rental on capital, w is the wage rate, and q is a vector of other input prices. The problem is to identify $r\bar{K}$ and $w\bar{L}$.

We begin by noting that the average cost curve of the firm is monotonically decreasing and approaches average variable cost, h(w, r, q), asymptotic-

ally. In these circumstances we define the minimum efficient scale (MES) of the firm to be that level of output at which average cost is one per cent greater than average variable cost. That is, MES is implicitly defined by the equation:

$$AC(y_m) = C(Y_m)/Y_m = 1.01 \cdot h(w, r, q), \qquad (A.2)$$

where y_m denotes MES. Given the definition of MES the following also holds:

$$AC(0.5\ Y_m) = (1 + s) \cdot 1.01 \cdot h(w, r, q), \qquad (A.3)$$

where s is the percentage by which average cost exceeds average variable cost at an output level one-half of MES. Alternatively, average cost at one-half MES can be written as:

$$AC(0.5 \cdot y_m) = h(w, r, q) + [r\bar{K}/(0.5 \cdot y_m)] + [w\bar{L}/(0.5 \cdot y_m)]. \qquad (A.4)$$

Equating (A.3) and (A.4) we have the expression:

$$r\bar{K} + w\bar{L} = (0.01 + 1.01s) \cdot h(w, r, q) \cdot 0.5\ y_m \qquad (A.5)$$

in the three unknowns $r\bar{K}$, $w\bar{L}$, and h(w, r, q).

We observe that average variable cost h can be decomposed in the following manner:

$$h(w, r, q) = g(w, r, q) - (w\bar{L}/y) + r(K^T - \bar{K})/y, \qquad (A.6)$$

where g(w, r, q) represents non-capital average costs and K^T represents the total capital employed by firm. Substituting (A.6) into (A.5) and rearranging terms we obtain:

$$r\bar{K} + w\bar{L} = [\tfrac{1}{2}y_m \cdot (0.01 + 1.01s) \cdot (g + rK^T/y)]/[1 + \tfrac{1}{2} \cdot y_m/y \cdot (0.01 + 1.01s)], \qquad (A.7)$$

which yields an expression for total fixed costs.

In order to allocate the total fixed costs between capital and labour the

following assumption is made. We assume:

$$\bar{K}/\bar{L} = (1 + \varepsilon) \cdot K^T/L^T = k. \tag{A.8}$$

That is, the ratio of fixed capital to fixed labour is equal to a constant times the observed overall capital to labour ratio K^T/L^T employed by the firm. Using this assumption the following expression is obtained for fixed capital costs:

$$r\bar{K} = \tfrac{1}{2}\cdot y_m\cdot(0.01 + 1.01s) \cdot [g + \frac{rK^T}{y}/(1 + \frac{w}{k\cdot r} + \tfrac{1}{2}\,\frac{y_m}{y}(0.01 + 1.01s)\cdot(\frac{w}{r\cdot k}+1)]. \tag{A.9}$$

Given a value for ε and data on the remaining variables on the right-hand side of equation (A.9), a value of fixed capital costs consistent with the postulated cost function is obtained. Once fixed capital costs are computed, a value of fixed labour costs is obtained from equation (A.8). Variable capital and labour costs are computed by subtracting fixed capital and labour costs from total payments to capital and labour respectively.

The data needed to perform the calculation outlined above was obtained from the following sources. Information on non-capital variable costs was obtained from Statistics Canada, Manufacturing Industries of Canada: National and Provincial Areas 1976, (31-203), 1977, Table 3. A value for g(w, r, q) was obtained by summing the industry payments of wages, fuel and electricity, and materials and dividing by the shipments in each industry. The construction of minimum efficient scale estimates for the variable y_m and an estimate for the parameter s are outlined in the next section. The overall capital-to-labour ratio was computed by dividing the capital stock in each industry by the total return to labour in each industry. The capital stock data was obtained from Statistics Canada, Fixed Capital Flows and Stocks 1972-1979, (13-211), 1979, Section 1. The total return to labour was that computed in the previous section. A value of five was used for the parameter to scale the overall capital/labour ratio.

Appendix A

TARIFF, TAX AND SUBSIDY RATES

Domestic ad valorem tariff rates were calculated utilizing data on total tariff payments by commodity which was provided by the Structural Division of Statistics Canada. These payments were converted to ad valorem rates by dividing the payments by the appropriate value of imports. Since the values of imports in the published input-output tables are inclusive of tariff duties paid, tariff payments were subtracted from the value of imports in this calculation. In addition, where possible these rates were supplemented by ad valorem equivalents of non-tariff barriers (NTBs). The sources for the ad valorem equivalents of NTBs were Hazledine (1981, Table 2) and Looking Outward (1975, Table 2-6).

Foreign ad valorem tariff rates and ad valorem NTB equivalents were adopted from Whalley (1980b, Table 3). In the Whalley study, tariff rates by commodity are presented for the United States, European Common Market, and Japan. For each commodity, a weighted average of the three tariff rates was computed where the weights were the domestic exports to each trading area divided by the total domestic exports to all three trading areas. Information on exports by commodity and destination was obtained from Statistics Canada, Summary of External Trade December 1976 (65-001), 1977, Table X-3.

All commodity tax rates in the model are expressed in ad valorem form. Tax rates on intermediate good transactions were computed by dividing the observed tax payment of industry i for the output of industry j by the observed value of the corresponding transactions, yielding a twenty-nine by twenty-nine matrix of tax rates. Similarly export and final demand tax rates were computed by dividing observed tax payments by the value of exports and final demand respectively. The data on tax payments needed to perform these calculations was obtained from the Structural Division of Statistics Canada.

In addition to payments for primary factors and intermediate goods the published input-output tables include entries for indirect taxes paid and government subsidies received by each industry. Indirect taxes represent not only commodity taxes such as provincial sales taxes but also other taxes such as the property tax. Since commodity taxes are treated separately in the model, the total commodity tax paid by each industry was deleted from the indirect tax category to avoid double counting. To calculate the net subsidy which each industry received, indirect taxes paid net of commodity

taxes were subtracted from subsidies received. An ad valorem subsidy rate was then computed by dividing the observed net subsidy by the value of industry output.

The domestic and foreign tariff rates are listed in Table B2.A.

MEASUREMENT OF MINIMUM EFFICIENT SCALE

The basic source of the estimates of minimum efficient scale for each of the manufacturing industries is Fuss and Gupta (1979, Table A). In this paper econometric estimates of MES are presented for various three- and four-digit industries within each of the twenty, two-digit manufacturing industries. MES estimates at the two-digit industry level were constructed as weighted averages of the appropriate three- and four-digit level estimates, with the weights being the ratio of shipments in each of these industries to the corresponding total. Further, since the Fuss-Gupta estimates were expressed in terms of 1968 dollars, 1976 equivalent values were obtained by multiplying the computed MES values by the appropriate industry price index. The price indexes were obtained from Statistics Canada, Industry Selling Price Indexes, August 1980 (62-011), 1980.

An additional parameter presented by Fuss-Gupta which is utilized is the percentage by average cost at one-half of MES exceeds average cost at MES. Again a value for this parameter at the two-digit level is obtained by computing a weighted average of the three-and four-digit level based on industry shipments as above. Values of industry shipments used in these computations were taken from Statistics Canada, Manufacturing Industries of Canada: National and Provincial Areas, 1976, (31-203), 1979, Table 3.

NUMBER OF FIRMS

Data on the number of firms existing in each manufacturing industry in 1976 were obtained from the Manufacturing and Primary Industries Division of Statistics Canada. The empirical counterpart of a firm in the model is identified as a 'long form' establishment as defined in the Statistics Canada publication Concepts and Definitions of the Census of Manufacturers (31-528), 1979. 'Long form' establishments represent approximately 50 per cent of the total number of establishments and account for approximately 95 per cent of the value of shipments in an industry. Given the small size of the other estab-

lishments ('small form') in the industry, it was decided that a 'long form' establishment better reflects the notion of a firm or plant used in the model.

A list of the number of firms existing in each industry is presented in Table B3.

IMPORT AND EXPORT ELASTICITIES

Values for export elasticities by commodity were obtained from the compendium of trade elasticities gathered by Stern, Francis, and Schumacher (1976, Tables 2.2 and 2.3). Stern et al. have compiled 'best guess' point estimates of import price elasticities by commodity for a number of countries. In order to identify the 'world' export elasticities facing domestic producers, a weighted average of the import elasticities of all trading partners was computed with the weights given by the ratio of Canadian exports of commodity i to country k to the total Canadian exports of commodity i. Information on Canadian exports was obtained from Statistics Canada, Summary of External Trade, December 1976 (65-001), 1977, Table X-3.

Values of price elasticities of import demand were obtained from the study by Hazledine (1981, Table 2). Since the estimates provided by Hazledine are at the four-digit industry level, estimates at the two-digit level were obtained by computing arithmetic averages of four-digit level estimates. The values of the computed import elasticities together with the export elasticities are presented in Table B2.A.

Appendix B
Base equilibrium tables

TABLE B1
Aggregate statistics - 1976 base equilibrium

1.	G.N.E.	157574.200
2.	B.O.P. Deficit	3842.000
3.	Capital Imports (Value)	6249.270
4.	Wage Bill	85336.915
5.	Capital Bill	61843.234
6.	Value-Added in Manufacturing	34542.750
7.	Other Value-Added	106387.747
8.	Aggregate Index of Intra-Industry Trade	0.659
9.	Fixed/Total Capital Ratio	0.219
10.	Fixed/Total Labour Ratio	0.074

TABLE B2
Base equilibrium tables - industry statistics

Industry	Output	Intermediate Domestic Demand	Consumption	Labour Requirements	Value-Added
1. Food and Beverage	17685.111	5939.435	10145.197	2950.917	4760.011
2. Tobacco	909.405	179.888	662.122	141.700	277.720
3. Rubber and Plastic	2340.745	1474.679	498.575	718.355	909.381
4. Leather	736.998	183.499	500.170	252.935	295.893
5. Textiles	2757.338	1685.203	741.537	767.706	985.950
6. Knitting Mills	639.272	190.555	430.330	213.410	260.284
7. Clothing	2658.436	240.157	2314.317	918.297	1099.236
8. Wood	5136.736	2973.273	215.623	1505.126	1886.583
9. Furniture and Fixtures	1498.148	182.882	1238.090	536.609	648.613
10. Paper and Allied Products	8470.951	3590.326	541.969	2188.865	3309.932
11. Printing and Publishing	3298.342	2228.852	968.267	1301.398	1754.704
12. Primary Metals	9237.210	6051.557	- 154.678(3)	2017.192	2677.065
13. Metal Fabricating	7172.426	5079.377	1221.537	2209.572	3101.094
14. Machinery	4170.153	1170.838	1662.256	1342.361	1706.692
15. Transportation Equipment	13809.915	1853.824	3625.590	2781.296	3737.392
16. Electrical Products	5110.980	2004.973	2430.694	1684.104	2298.696
17. Non-Metallic Mineral Production	2926.154	2513.543	197.222	840.646	1340.050
18. Petroleum and Coal	6998.925	3669.404	2899.262	344.400	554.673
19. Chemical Products	5886.879	3674.972	1329.567	1256.785	1962.257
20. Misc. Manufacturing	2236.488	802.061	1066.101	754.316	976 .522
21. Agriculture	10304.471	6008.887	1822.211	1621.259	6272.297
22. Forestry	2651.516	2557.976	34.823	1007.544	1249.023
23. Fishing	428.600	271.058	21.891	169.664	298.025

24. Mining	14536.943	7613.650	595.344	2479.137	8278.765
25. Construction	33698.109	4746.189	28950.256	11614.164	15990.681
26. Transportation	14296.569	10028.982	3028.090	5942.145	8446.485
27. Communication	5501.230	2914.985	2451.104	2887.561	4533.083
28. Electric, Power and Gas	5045.730	2333.227	2544.024	1261.174	3833.263
29. Others	107255.017	42272.531	61704.224	33628.277	57486.318

NOTE: All variables in this and subsequent tables in appendices are defined in Appendix C.

TABLE B2.A
Base equilibrium tables - trade statistics

Industry	Export Elasticity	Import Elasticity	Adjusted Import Elasticity	Elasticity of Substitution	Foreign Tariffs	Domestic Tariffs
1. Food and Beverage	- 0.88	- 1.25	- 2.00	1.28	0.229	0.143
2. Tobacco	- 0.78	- 1.00	- 2.00	1.10	0.031	0.307
3. Rubber and Plastic	- 2.90	- 3.20	- 3.00	4.28	0.067	0.099
4. Leather	- 1.49	- 1.45	- 2.00	1.71	0.068	0.166
5. Textiles	- 1.33	- 1.00	- 2.00	1.10	0.525	0.171
6. Knitting Mills	- 1.00	- 1.00	- 2.00	1.10	0.533	0.332
7. Clothing	- 1.85	- 3.40	- 3.00	4.07	0.533	0.324
8. Wood	- 0.89	- 1.00	- 2.00	1.10	0.041	0.063
9. Furniture and Fixtures	- 1.00	- 2.80	- 3.00	3.11	0.040	0.158
10. Paper and Allied Products	- 1.19	- 1.25	- 2.00	1.31	0.350	0.100
11. Printing and Publishing	- 2.68	- 2.85	- 3.00	3.23	0.319	0.056
12. Primary Metals	- 1.38	- 1.30	- 2.00	2.01	0.051	0.056
13. Metal Fabricating	- 2.16	- 3.10	- 3.00	4.22	0.048	0.087
14. Machinery	- 1.12	- 1.00	- 2.00	1.10	0.049	0.050
15. Transportation Equipment	- 3.08	- 2.65	- 3.00	4.84	0.036	0.060
16. Electrical Products	- 1.15	- 0.95	- 2.00	1.10	0.071	0.104
17. Non-Metallic Mineral Production	- 2.02	- 2.10	- 3.00	2.48	0.055	0.076
18. Petroleum and Coal	- 0.90	- 0.96	- 2.00	1.10	0.002	0.028
19. Chemical Products	- 2.25	- 1.95	- 3.00	2.22	0.062	0.062
20. Misc. Manufacturing	- 1.71	- 1.70	- 3.00	2.36	0.068	0.091
21. Agriculture	- 1.00	- 1.00	- 2.00	1.10	0.462	0.066
22. Forestry	- 0.51	- 1.00	- 2.00	1.10	0.522	0.004

23. Fishing	- 0.48	- 1.00	- 2.00	1.10	0.498	0.005
24. Mining	- 0.48	- 1.00	- 2.00	1.10	0.000	0.137
25. Construction	- 1.00	- 1.00	- 2.00	1.10	0.000	0.000
26. Transportation	- 1.00	- 0.05	- 1.00	0.10	0.000	0.049
27. Communication	- 1.00	- 0.05	- 1.00	0.10	0.000	0.052
28. Electric, Power and Gas	- 1.00	- 0.05	- 1.00	0.10	0.000	0.000
29. Others	- 1.32	- 1.00	- 2.00	1.10	0.000	0.011

TABLE B2.B
Trade statistics

Industry	Exports	Imports	Intra-Industry Trade Index
1. Food and Beverage	1600.480	1871.832	0.9888
2. Tobacco	67.394	27.479	0.4754
3. Rubber and Plastic	367.490	1037.550	0.5607
4. Leather	53.330	395.277	0.2719
5. Textiles	330.598	1609.706	0.3880
6. Knitting Mills	18.388	345.545	0.1329
7. Clothing	103.962	697.488	0.3302
8. Wood	1947.840	450.031	0.3570
9. Furniture and Fixtures	77.177	246.006	0.5337
10. Paper and Allied Products	4338.656	812.269	0.2905
11. Printing and Publishing	101.223	489.397	0.3589
12. Primary Metals	3340.331	1359.184	0.5587
13. Metal Fabricating	871.512	2225.145	0.5974
14. Machinery	1337.060	4459.653	0.4789
15. Transportation Equipment	8330.501	9403.515	0.9695
16. Electrical Products	675.313	2476.565	0.4635
17. Non-Metallic Mineral Production	215.389	537.020	0.6034
18. Petroleum and Coal	430.259	186.100	0.5926
19. Chemical Products	882.340	1837.478	0.6762
20. Misc. Manufacturing	368.326	1653.478	0.3913
21. Agriculture	2437.373	925.861	0.5192
22. Forestry	58.716	70.106	0.9141
23. Fishing	135.651	122.368	0.9455
24. Mining	6327.948	4938.316	0.8151
25. Construction	1.664	5.918	0.4340
26. Transportation	1239.497	376.361	0.4485
27. Communication	135.141	173.352	0.9015
28. Electric, Power and Gas	168.479	12.083	0.1338
29. Others	3278.261	2156.716	0.7880

TABLE B3
Base equilibrium tables - industrial structure statistics for manufacturing

Industry	Number of Firms	Unit Cost	MES	MES/ Output Ratio	Scale Elasticity	Fixed Capital Cost	Fixed Labour Cost	Fixed/ Variable Cost Ratio	Base Long-Run Markup
1. Food and Beverage	2226	0.951	21.497	4.237	0.9594	369.474	344.323	0.042	1.042
2. Tobacco	24	0.898	49.769	1.501	0.9852	5.681	6.610	0.015	1.015
3. Rubber and Plastic	399	0.987	18.146	4.072	0.9609	41.055	53.470	0.041	1.041
4. Leather	222	0.990	1.021	0.810	0.9920	1.593	4.331	0.008	1.008
5. Textiles	436	1.063	9.364	1.236	0.9878	19.749	16.648	0.012	1.012
6. Knitting Mills	188	0.988	1.186	0.576	0.9943	1.112	2.530	0.006	1.006
7. Clothing	942	0.933	2.421	1.742	0.9829	4.544	38.628	0.017	1.017
8. Wood	1296	0.973	8.513	6.160	0.9420	136.088	172.768	0.062	1.062
9. Furniture and Fixtures	581	0.966	2.503	0.8621	0.9915	3.032	9.460	0.009	1.009
10. Paper and Allied Products	488	1.088	18.665	1.6318	0.9839	98.730	51.661	0.016	1.016
11. Printing Publishing	1045	0.922	7.480	3.196	0.9690	32.085	66.142	0.032	1.032
12. Primary Metals	243	1.072	150.307	5.110	0.9514	337.419	182.174	0.052	1.052
13. Metal Fabricating	1460	0.944	5.671	1.287	0.9873	31.516	56.143	0.013	1.013
14. Machinery	559	0.963	3.716	1.746	0.9828	22.001	48.220	0.017	1.017
15. Transportation Equipment	522	0.894	275.556	11.262	0.8988	570.715	837.673	0.114	1.114
16. Electrical Products	468	0.949	6.843	0.730	0.9928	11.929	23.663	0.007	1.007
17. Non-Metallic Mineral Production	703	0.925	6.268	12.110	0.8920	199.334	132.041	0.122	1.122

18. Petroleum and Coal	92	1.235	42.549	1.082	0.9893	79.939	14.151	0.011	1.011
19. Chemical Products	701	1.071	10.336	2.148	0.9790	93.244	43.941	0.022	1.022
20. Miscellaneous Manufacturing	767	0.973	2.573	1.299	0.9872	7.950	20.792	0.013	1.013

TABLE B3.A

Domestic input-output table - base equilibrium

	Industry 1	Industry 2	Industry 3	Industry 4	Industry 5
Commodity 1	0.11361	0.00244	0.00409	0.04426	0.00269
Commodity 2	0.00001	0.08747	0.00000	0.00001	0.00001
Commodity 3	0.00253	0.00120	0.02807	0.06569	0.01315
Commodity 4	0.00003	0.00001	0.00163	0.09208	0.00052
Commodity 5	0.00062	0.00225	0.02790	0.00766	0.19609
Commodity 6	0.00001	0.00003	0.00676	0.00103	0.01865
Commodity 7	0.00007	0.00001	0.00065	0.00377	0.01788
Commodity 8	0.00029	0.00011	0.00200	0.00205	0.00062
Commodity 9	0.00007	0.00001	0.00024	0.00014	0.00023
Commodity 10	0.01575	0.02855	0.02338	0.01215	0.01899
Commodity 11	0.00313	0.00145	0.00119	0.00185	0.00159
Commodity 12	0.00097	0.00015	0.01063	0.00141	0.00355
Commodity 13	0.00912	0.00163	0.01685	0.00957	0.00840
Commodity 14	0.00072	0.00012	0.00167	0.00117	0.00128
Commodity 15	0.00080	0.00012	0.00267	0.00170	0.00312
Commodity 16	0.00048	0.00008	0.00190	0.00088	0.00088
Commodity 17	0.00476	0.00002	0.00266	0.00074	0.00048
Commodity 18	0.00355	0.00053	0.00523	0.00189	0.00838
Commodity 19	0.00636	0.00210	0.20481	0.02043	0.05268
Commodity 20	0.00116	0.00140	0.00394	0.00881	0.01460
Commodity 21	0.19097	0.09020	0.00002	0.00098	0.00043
Commodity 22	0.00069	0.00095	0.00003	0.00003	0.00003
Commodity 23	0.01020	0.00000	0.00000	0.00001	0.00000
Commodity 24	0.00195	0.00027	0.00489	0.00193	0.00387
Commodity 25	0.00186	0.00165	0.00391	0.00300	0.00414
Commodity 26	0.00440	0.00057	0.00190	0.00114	0.00180
Commodity 27	0.00198	0.00099	0.00648	0.00443	0.00486
Commodity 28	0.00402	0.00128	0.01573	0.00412	0.01232
Commodity 29	0.07844	0.04841	0.15402	0.12332	0.13361

TABLE B3.B

Domestic input-output table - base equilibrium

	Industry 6	Industry 7	Industry 8	Industry 9	Industry 10
Commodity 1	0.00106	0.00113	0.00128	0.00174	0.00331
Commodity 2	0.00000	0.00001	0.00001	0.00001	0.00000
Commodity 3	0.00122	0.00177	0.00272	0.02131	0.00433
Commodity 4	0.00028	0.01435	0.00005	0.00078	0.00003
Commodity 5	0.28780	0.14093	0.00045	0.03381	0.00343
Commodity 6	0.00998	0.03469	0.00004	0.00732	0.00003
Commodity 7	0.03105	0.03963	0.00014	0.00025	0.00010
Commodity 8	0.00005	0.00008	0.10480	0.05353	0.05485
Commodity 9	0.00005	0.00013	0.00226	0.02339	0.00165
Commodity 10	0.01160	0.00526	0.00414	0.01647	0.11822
Commodity 11	0.00434	0.00077	0.00020	0.00141	0.00136
Commodity 12	0.00012	0.00009	0.00407	0.02361	0.00450
Commodity 13	0.00074	0.00182	0.00991	0.03774	0.00369
Commodity 14	0.00027	0.00053	0.00096	0.00300	0.00046
Commodity 15	0.00055	0.00133	0.00178	0.00254	0.00119
Commodity 16	0.00027	0.00059	0.00189	0.00695	0.00042
Commodity 17	0.00015	0.00024	0.00425	0.00321	0.00217
Commodity 18	0.00369	0.00110	0.00626	0.00209	0.02775
Commodity 19	0.00980	0.00170	0.00839	0.00842	0.03110
Commodity 20	0.00241	0.00984	0.00080	0.00412	0.00138
Commodity 21	0.00059	0.00974	0.00814	0.00002	0.00278
Commodity 22	0.00002	0.00012	0.26925	0.00059	0.09182
Commodity 23	0.00000	0.00019	0.00000	0.00000	0.00000
Commodity 24	0.00159	0.00031	0.00214	0.00125	0.01023
Commodity 25	0.00188	0.00090	0.00437	0.00190	0.00489
Commodity 26	0.00131	0.00115	0.00156	0.00100	0.00413
Commodity 27	0.00503	0.00392	0.00295	0.00395	0.00251
Commodity 28	0.00703	0.00229	0.01182	0.00448	0.02811
Commodity 29	0.09574	0.08482	0.12821	0.09236	0.11191

TABLE B3.C

Domestic input-output table - base equilibrium

	Industry 11	Industry 12	Industry 13	Industry 14	Industry 15
Commodity 1	0.00253	0.00130	0.00203	0.00135	0.00079
Commodity 2	0.00000	0.00001	0.00001	0.00001	0.00000
Commodity 3	0.00123	0.00071	0.00528	0.01091	0.01561
Commodity 4	0.00008	0.00005	0.00009	0.00040	0.00059
Commodity 5	0.00127	0.00019	0.00099	0.00086	0.00689
Commodity 6	0.00022	0.00001	0.00002	0.00003	0.00006
Commodity 7	0.00013	0.00017	0.00017	0.00015	0.00010
Commodity 8	0.00038	0.00107	0.00456	0.00253	0.00353
Commodity 9	0.00005	0.00012	0.00076	0.00042	0.00104
Commodity 10	0.32289	0.00152	0.01065	0.00292	0.00183
Commodity 11	0.09717	0.00015	0.00123	0.00048	0.00010
Commodity 12	0.00201	0.15229	0.39006	0.11075	0.05111
Commodity 13	0.00105	0.01858	0.17939	0.05520	0.02689
Commodity 14	0.00093	0.00299	0.01140	0.04469	0.00623
Commodity 15	0.00133	0.00217	0.00445	0.00902	0.06997
Commodity 16	0.00088	0.00188	0.00709	0.02740	0.01113
Commodity 17	0.00036	0.00774	0.00924	0.00211	0.00484
Commodity 18	0.00394	0.01267	0.00533	0.00237	0.00194
Commodity 19	0.02237	0.00663	0.01443	0.00394	0.00384
Commodity 20	0.00590	0.00550	0.00361	0.00196	0.00223
Commodity 21	0.00002	0.00000	0.00001	0.00001	0.00000
Commodity 22	0.00002	0.00003	0.00005	0.00003	0.00002
Commodity 23	0.00001	0.00000	0.00000	0.00000	0.00000
Commodity 24	0.00188	0.24217	0.01074	0.00352	0.00140
Commodity 25	0.00432	0.00777	0.00497	0.00468	0.00184
Commodity 26	0.00238	0.00459	0.00381	0.00144	0.00507
Commodity 27	0.03061	0.00266	0.00884	0.00753	0.00335
Commodity 28	0.00809	0.02245	0.01091	0.00511	0.00370
Commodity 29	0.22039	0.13440	0.17313	0.12105	0.09058

TABLE B3.D

Domestic input-output table - base equilibrium

	Industry 16	Industry 17	Industry 18	Industry 19	Industry 20
Commodity 1	0.00116	0.00250	0.00086	0.01724	0.00233
Commodity 2	0.00000	0.00001	0.00000	0.00000	0.00001
Commodity 3	0.01017	0.00773	0.00018	0.01155	0.01998
Commodity 4	0.00027	0.00012	0.00001	0.00008	0.00523
Commodity 5	0.00070	0.00173	0.00003	0.00199	0.01092
Commodity 6	0.00002	0.00014	0.00000	0.00014	0.00156
Commodity 7	0.00011	0.00014	0.00001	0.00012	0.00049
Commodity 8	0.00242	0.00330	0.00003	0.00077	0.03758
Commodity 9	0.00184	0.00026	0.00002	0.00014	0.00116
Commodity 10	0.00899	0.03270	0.00048	0.02361	0.02486
Commodity 11	0.00084	0.00101	0.00004	0.00311	0.00360
Commodity 12	0.11604	0.01425	0.00052	0.01436	0.05157
Commodity 13	0.03465	0.01645	0.00168	0.01283	0.02434
Commodity 14	0.01296	0.00200	0.00014	0.00140	0.00340
Commodity 15	0.00420	0.00185	0.00009	0.00140	0.00245
Commodity 16	0.10399	0.00275	0.00007	0.00098	0.01183
Commodity 17	0.00678	0.20557	0.00026	0.00620	0.00383
Commodity 18	0.00213	0.04028	0.00849	0.05662	0.00365
Commodity 19	0.01715	0.02909	0.01234	0.18672	0.03518
Commodity 20	0.00388	0.00574	0.00126	0.00468	0.04190
Commodity 21	0.00001	0.00002	0.00000	0.00027	0.00138
Commodity 22	0.00003	0.00005	0.00000	0.00005	0.00035
Commodity 23	0.00000	0.00001	0.00000	0.00001	0.00001
Commodity 24	0.00230	0.12290	0.34357	0.05921	0.02770
Commodity 25	0.00341	0.00960	0.01164	0.00705	0.00289
Commodity 26	0.00339	0.00973	0.02576	0.01012	0.00169
Commodity 27	0.01405	0.00833	0.00152	0.00951	0.00934
Commodity 28	0.00640	0.04434	0.00529	0.03326	0.00579
Commodity 29	0.11882	0.27012	0.03225	0.20792	0.17320

TABLE B3.E

Domestic input-output table - base equilibrium

	Industry 21	Industry 22	Industry 23	Industry 24	Industry 25
Commodity 1	0.15907	0.00066	0.00180	0.00087	0.00180
Commodity 2	0.00001	0.00000	0.00001	0.00000	0.00001
Commodity 3	0.00387	0.00038	0.00185	0.00024	0.00858
Commodity 4	0.00018	0.00003	0.00016	0.00002	0.00015
Commodity 5	0.00327	0.00321	0.03933	0.00042	0.00378
Commodity 6	0.00001	0.00001	0.00007	0.00000	0.00006
Commodity 7	0.00024	0.00011	0.00062	0.00007	0.00023
Commodity 8	0.00075	0.00677	0.01818	0.00026	0.04826
Commodity 9	0.00010	0.00017	0.00063	0.00005	0.00179
Commodity 10	0.00106	0.00022	0.00090	0.00092	0.00682
Commodity 11	0.00019	0.00010	0.00024	0.00015	0.00023
Commodity 12	0.00124	0.00101	0.00134	0.00696	0.02847
Commodity 13	0.00493	0.01184	0.01106	0.00195	0.06631
Commodity 14	0.00377	0.00462	0.01220	0.00312	0.00626
Commodity 15	0.00235	0.00364	0.08196	0.00123	0.00365
Commodity 16	0.00101	0.00134	0.03823	0.00061	0.02219
Commodity 17	0.00085	0.00030	0.00203	0.00102	0.04989
Commodity 18	0.06899	0.07390	0.13769	0.01745	0.01287
Commodity 19	0.04811	0.00261	0.00576	0.00959	0.00803
Commodity 20	0.00078	0.00097	0.01060	0.00032	0.00183
Commodity 21	0.07291	0.00685	0.00001	0.00009	0.00038
Commodity 22	0.00049	0.22538	0.00014	0.00002	0.00054
Commodity 23	0.00000	0.00005	0.01774	0.00000	0.00001
Commodity 24	0.00945	0.00132	0.00867	0.04498	0.02305
Commodity 25	0.03309	0.03784	0.02927	0.03213	0.00040
Commodity 26	0.00444	0.19433	0.01768	0.00892	0.00810
Commodity 27	0.00725	0.00343	0.00498	0.00252	0.00340
Commodity 28	0.02109	0.00258	0.00219	0.01858	0.00068
Commodity 29	0.16395	0.46252	0.15516	0.32206	0.13208

TABLE B3.F

Domestic input-output table - base equilibrium

	Industry 26	Industry 27	Industry 28	Industry 29
Commodity 1	0.00113	0.00014	0.00013	0.02305
Commodity 2	0.00000	0.00000	0.00000	0.00001
Commodity 3	0.00857	0.00030	0.00002	0.00443
Commodity 4	0.00035	0.00001	0.00001	0.00034
Commodity 5	0.00154	0.00076	0.00001	0.00209
Commodity 6	0.00002	0.00000	0.00000	0.00006
Commodity 7	0.00013	0.00003	0.00002	0.00049
Commodity 8	0.00018	0.00004	0.00002	0.00099
Commodity 9	0.00013	0.00025	0.00002	0.00019
Commodity 10	0.00125	0.00019	0.00007	0.00960
Commodity 11	0.00101	0.00785	0.00065	0.02372
Commodity 12	0.00322	0.00015	0.00036	0.00110
Commodity 13	0.00320	0.00056	0.00013	0.00751
Commodity 14	0.00186	0.00186	0.00025	0.00537
Commodity 15	0.02784	0.00089	0.00026	0.00287
Commodity 16	0.00328	0.02339	0.00018	0.00405
Commodity 17	0.00138	0.00003	0.00003	0.00084
Commodity 18	0.14946	0.00830	0.05516	0.01224
Commodity 19	0.00214	0.00059	0.00011	0.00642
Commodity 20	0.00138	0.00169	0.00020	0.00408
Commodity 21	0.00039	0.00001	0.00002	0.00662
Commodity 22	0.00016	0.00002	0.00001	0.00016
Commodity 23	0.00003	0.00000	0.00001	0.00018
Commodity 24	0.01340	0.00036	0.03131	0.00246
Commodity 25	0.06064	0.03705	0.06760	0.03391
Commodity 26	0.17266	0.03309	0.01386	0.08730
Commodity 27	0.02773	0.05312	0.00576	0.02196
Commodity 28	0.01166	0.00591	0.01461	0.00803
Commodity 29	0.24652	0.16126	0.09091	0.21566

TABLE B3.G

Foreign input-output table - base equilibrium

	Industry 1	Industry 2	Industry 3	Industry 4	Industry 5
Commodity 1	0.01263	0.00033	0.00112	0.00458	0.00053
Commodity 2	0.00000	0.00376	0.00000	0.00000	0.00000
Commodity 3	0.00082	0.00034	0.01174	0.02905	0.00569
Commodity 4	0.00000	0.00000	0.00093	0.05580	0.00021
Commodity 5	0.00016	0.00116	0.02121	0.00414	0.12370
Commodity 6	0.00000	0.00002	0.00533	0.00079	0.01418
Commodity 7	0.00000	0.00000	0.00014	0.00091	0.00448
Commodity 8	0.00003	0.00001	0.00022	0.00035	0.00008
Commodity 9	0.00001	0.00000	0.00005	0.00003	0.00009
Commodity 10	0.00273	0.00498	0.00491	0.00252	0.00334
Commodity 11	0.00063	0.00027	0.00022	0.00037	0.00032
Commodity 12	0.00032	0.00005	0.00420	0.00044	0.00109
Commodity 13	0.00291	0.00048	0.00571	0.00317	0.00357
Commodity 14	0.00033	0.00002	0.00117	0.00026	0.00087
Commodity 15	0.00006	0.00001	0.00573	0.00009	0.00586
Commodity 16	0.00007	0.00001	0.00066	0.00007	0.00010
Commodity 17	0.00206	0.00000	0.00109	0.00024	0.00011
Commodity 18	0.00009	0.00002	0.00046	0.00013	0.00043
Commodity 19	0.00207	0.00096	0.09911	0.00801	0.02263
Commodity 20	0.00023	0.00024	0.00208	0.00500	0.00941
Commodity 21	0.02008	0.02007	0.00000	0.00009	0.00009
Commodity 22	0.00015	0.00021	0.00000	0.00000	0.00000
Commodity 23	0.00293	0.0	0.0	0.00000	0.0
Commodity 24	0.00018	0.00001	0.00054	0.00015	0.00029
Commodity 25	0.00000	0.00000	0.00001	0.00000	0.00000
Commodity 26	0.00013	0.00002	0.00013	0.00004	0.00010
Commodity 27	0.00003	0.00002	0.00014	0.00007	0.00008
Commodity 28	0.00001	0.00000	0.00003	0.00001	0.00003
Commodity 29	0.00134	0.00079	0.00356	0.00402	0.00500

TABLE B3.H

Foreign input-output table - base equilibrium

	Industry 6	Industry 7	Industry 8	Industry 9	Industry 10
Commodity 1	0.00021	0.00006	0.00012	0.00020	0.00057
Commodity 2	0.0	0.00000	0.00000	0.00000	0.00000
Commodity 3	0.00036	0.00065	0.00093	0.00862	0.00156
Commodity 4	0.00007	0.00860	0.00000	0.00039	0.00001
Commodity 5	0.17178	0.10034	0.00018	0.02256	0.00113
Commodity 6	0.00641	0.02718	0.00003	0.00578	0.00002
Commodity 7	0.00801	0.00992	0.00000	0.00003	0.00001
Commodity 8	0.00001	0.00001	0.01833	0.00968	0.00366
Commodity 9	0.00001	0.00005	0.00031	0.00397	0.00012
Commodity 10	0.00205	0.00101	0.00081	0.00313	0.02104
Commodity 11	0.00090	0.00015	0.00002	0.00026	0.00026
Commodity 12	0.00002	0.00001	0.00096	0.00449	0.00133
Commodity 13	0.00024	0.00093	0.00255	0.01186	0.00100
Commodity 14	0.00001	0.00004	0.00023	0.00147	0.00011
Commodity 15	0.00001	0.00003	0.00018	0.00031	0.00006
Commodity 16	0.00001	0.00002	0.00086	0.00261	0.00003
Commodity 17	0.00003	0.00004	0.00179	0.00131	0.00089
Commodity 18	0.00007	0.00015	0.00024	0.00009	0.00073
Commodity 19	0.00295	0.00059	0.00306	0.00232	0.01390
Commodity 20	0.00111	0.00631	0.00020	0.00194	0.00028
Commodity 21	0.00013	0.00217	0.00020	0.00000	0.00007
Commodity 22	0.00000	0.00002	0.00662	0.00004	0.00226
Commodity 23	0.0	0.01273	0.00000	0.0	0.00000
Commodity 24	0.00002	0.00001	0.00013	0.00006	0.00205
Commodity 25	0.00001	0.00000	0.00000	0.00000	0.00000
Commodity 26	0.00007	0.00003	0.00008	0.00005	0.00029
Commodity 27	0.00007	0.00006	0.00006	0.00022	0.00004
Commodity 28	0.00002	0.00001	0.00003	0.00001	0.00007
Commodity 29	0.00210	0.00362	0.00166	0.00230	0.00130

TABLE B3.1

Foreign input-output table - base equilibrium

	Industry 11	Industry 12	Industry 13	Industry 14	Industry 15
Commodity 1	0.00050	0.00007	0.00030	0.00025	0.00010
Commodity 2	0.00000	0.00000	0.00000	0.00000	0.00000
Commodity 3	0.00041	0.00022	0.00200	0.00649	0.01710
Commodity 4	0.00003	0.00000	0.00002	0.00017	0.00028
Commodity 5	0.00079	0.00004	0.00058	0.00216	0.02073
Commodity 6	0.00017	0.00000	0.00001	0.00003	0.00004
Commodity 7	0.00000	0.00000	0.00000	0.00000	0.00001
Commodity 8	0.00007	0.00016	0.00083	0.00086	0.00071
Commodity 9	0.00001	0.00002	0.00019	0.00015	0.00020
Commodity 10	0.06566	0.00032	0.00203	0.00164	0.00047
Commodity 11	0.02048	0.00001	0.00023	0.00013	0.00002
Commodity 12	0.00095	0.03908	0.07908	0.02242	0.01050
Commodity 13	0.00033	0.00575	0.04337	0.02301	0.01706
Commodity 14	0.00040	0.00271	0.00875	0.08309	0.00831
Commodity 15	0.00003	0.00025	0.00426	0.02518	0.24391
Commodity 16	0.00038	0.00059	0.00285	0.01377	0.00709
Commodity 17	0.00007	0.00329	0.00378	0.00084	0.00207
Commodity 18	0.00027	0.00086	0.00030	0.00014	0.00013
Commodity 19	0.00649	0.00242	0.00457	0.00123	0.00114
Commodity 20	0.00734	0.00151	0.00219	0.00172	0.00288
Commodity 21	0.00000	0.00000	0.00000	0.00000	0.00000
Commodity 22	0.00000	0.00000	0.00000	0.00001	0.00000
Commodity 23	0.0	0.0	0.00000	0.0	0.0
Commodity 24	0.00009	0.10260	0.00140	0.00125	0.00033
Commodity 25	0.00001	0.00000	0.00001	0.00000	0.00000
Commodity 26	0.00009	0.00036	0.00018	0.00008	0.00072
Commodity 27	0.00039	0.00005	0.00024	0.00080	0.00030
Commodity 28	0.00002	0.00005	0.00002	0.00001	0.00001
Commodity 29	0.00590	0.00168	0.00348	0.00304	0.00550

TABLE B3.J

Foreign input-output table - base equilibrium

	Industry 16	Industry 17	Industry 18	Industry 19	Industry 20
Commodity 1	0.00018	0.00042	0.00024	0.00325	0.00042
Commodity 2	0.00000	0.00000	0.0	0.00000	0.00000
Commodity 3	0.00446	0.00296	0.00008	0.00459	0.00786
Commodity 4	0.00011	0.00005	0.00001	0.00002	0.00315
Commodity 5	0.00027	0.00087	0.00002	0.00091	0.00697
Commodity 6	0.00001	0.00011	0.00000	0.00010	0.00122
Commodity 7	0.00000	0.00000	0.00000	0.00000	0.00010
Commodity 8	0.00031	0.00032	0.00000	0.00008	0.00661
Commodity 9	0.00057	0.00006	0.00001	0.00003	0.00041
Commodity 10	0.00178	0.00630	0.00010	0.00429	0.00500
Commodity 11	0.00016	0.00018	0.00001	0.00062	0.00075
Commodity 12	0.02345	0.00382	0.00011	0.00554	0.01929
Commodity 13	0.01107	0.00529	0.00060	0.00424	0.00879
Commodity 14	0.01200	0.00133	0.00007	0.00076	0.00304
Commodity 15	0.00154	0.00021	0.00001	0.00011	0.00073
Commodity 16	0.05052	0.00090	0.00001	0.00020	0.00779
Commodity 17	0.00292	0.01846	0.00004	0.00253	0.00160
Commodity 18	0.00018	0.00143	0.00122	0.00663	0.00044
Commodity 19	0.00745	0.01258	0.00356	0.08212	0.01580
Commodity 20	0.00340	0.00304	0.00083	0.00227	0.05416
Commodity 21	0.00000	0.00000	0.00000	0.00003	0.00030
Commodity 22	0.00000	0.00000	0.00000	0.00000	0.00003
Commodity 23	0.0	0.0	0.0	0.00000	0.00019
Commodity 24	0.00026	0.03683	0.38885	0.01250	0.00530
Commodity 25	0.00000	0.00001	0.00000	0.00001	0.00001
Commodity 26	0.00012	0.00088	0.00269	0.00089	0.00007
Commodity 27	0.00291	0.00018	0.00003	0.00015	0.00034
Commodity 28	0.00001	0.00010	0.00008	0.00007	0.00001
Commodity 29	0.00257	0.00354	0.00118	0.00412	0.00666

TABLE B3.K

Foreign input-output table - base equilibrium

	Industry 21	Industry 22	Industry 23	Industry 24	Industry 25
Commodity 1	0.01100	0.00007	0.00011	0.00017	0.00017
Commodity 2	0.00000	0.00000	0.0	0.00000	0.00000
Commodity 3	0.00171	0.00015	0.00094	0.00012	0.00321
Commodity 4	0.00006	0.00000	0.00005	0.00000	0.00005
Commodity 5	0.00101	0.00101	0.01314	0.00013	0.00133
Commodity 6	0.00000	0.00000	0.00003	0.00000	0.00004
Commodity 7	0.00001	0.00001	0.00013	0.00000	0.00001
Commodity 8	0.00005	0.00021	0.00384	0.00006	0.00662
Commodity 9	0.00001	0.00002	0.00024	0.00000	0.00027
Commodity 10	0.00018	0.00011	0.00048	0.00023	0.00146
Commodity 11	0.00001	0.00001	0.00004	0.00002	0.00002
Commodity 12	0.00045	0.00042	0.00068	0.00137	0.00527
Commodity 13	0.00154	0.00418	0.00586	0.00104	0.01404
Commodity 14	0.01060	0.00510	0.01455	0.00464	0.00524
Commodity 15	0.00020	0.00126	0.04199	0.00050	0.00144
Commodity 16	0.00005	0.00022	0.01621	0.00025	0.00925
Commodity 17	0.00024	0.00008	0.00076	0.00039	0.00670
Commodity 18	0.00152	0.00104	0.00329	0.00046	0.00081
Commodity 19	0.02148	0.00072	0.00164	0.00332	0.00212
Commodity 20	0.00012	0.00009	0.00667	0.00007	0.00090
Commodity 21	0.00915	0.00017	0.00000	0.00000	0.00008
Commodity 22	0.00008	0.00550	0.00002	0.00000	0.00003
Commodity 23	0.00000	0.00000	0.00508	0.00000	0.00000
Commodity 24	0.01297	0.00013	0.00197	0.00153	0.00165
Commodity 25	0.00001	0.00003	0.00001	0.00005	0.00001
Commodity 26	0.00013	0.00403	0.00400	0.00028	0.00018
Commodity 27	0.00011	0.00006	0.00113	0.00007	0.00065
Commodity 28	0.00005	0.00001	0.00001	0.00005	0.00000
Commodity 29	0.00300	0.00451	0.00405	0.00996	0.00683

TABLE B3.L

Foreign input-output table - base equilibrium

	Industry 26	Industry 27	Industry 28	Industry 29
Commodity 1	0.00006	0.00001	0.00000	0.00245
Commodity 2	0.00000	0.00000	0.00000	0.00000
Commodity 3	0.00446	0.00015	0.00000	0.00216
Commodity 4	0.00015	0.00000	0.00000	0.00018
Commodity 5	0.00144	0.00026	0.00000	0.00122
Commodity 6	0.00001	0.00000	0.00000	0.00004
Commodity 7	0.00001	0.00000	0.00000	0.00010
Commodity 8	0.00001	0.00000	0.00000	0.00013
Commodity 9	0.00001	0.00010	0.00000	0.00004
Commodity 10	0.00021	0.00003	0.00000	0.00182
Commodity 11	0.00019	0.00165	0.00013	0.00274
Commodity 12	0.00057	0.00004	0.00006	0.00049
Commodity 13	0.00110	0.00023	0.00000	0.00338
Commodity 14	0.00054	0.00077	0.00001	0.00717
Commodity 15	0.02377	0.00027	0.00000	0.00587
Commodity 16	0.00101	0.01048	0.00001	0.00171
Commodity 17	0.00053	0.00000	0.00000	0.00031
Commodity 18	0.00232	0.00015	0.00070	0.00025
Commodity 19	0.00046	0.00024	0.00001	0.00220
Commodity 20	0.00058	0.00254	0.00002	0.00391
Commodity 21	0.00008	0.00000	0.00000	0.00062
Commodity 22	0.00000	0.00000	0.00000	0.00001
Commodity 23	0.00000	0.00000	0.00000	0.00005
Commodity 24	0.00171	0.00002	0.09087	0.00021
Commodity 25	0.00002	0.00001	0.00001	0.00002
Commodity 26	0.00609	0.00069	0.00129	0.00183
Commodity 27	0.00048	0.00136	0.00009	0.00045
Commodity 28	0.00007	0.00001	0.00006	0.00002
Commodity 29	0.00467	0.00525	0.00267	0.00672

Appendix C
Output documentation for GET

In this appendix precise definitions of a relevant industry and aggregate summary statistics are given, which appear in the tables and text. In the base equilibrium all prices are set equal to unity, so base values and quantities coincide. All quantity variables in the model are in terms of 1976 constant dollar indexes; units are millions of 1976 Canadian dollars. Foreign prices are held constant throughout.

Index Sets: i,j indexes industries and commodities

N index set for non-competitive industries

C index set for competitive industries

B index set for non-competing imports

$M = N \cup C$ $\quad G = M \cup B$

$n = \#N$ $\quad m = \#M$ $\quad g = \#G$

G can be thought of as an index set for goods, exclusive of primary factors

EXOGENOUS DATA

Taxes, subsidies, and tariffs

t_{ij} : ad valorem tax on industry i per \$ use of commodity j as factor input, $i \varepsilon M$, $j \varepsilon G$

t_j : ad valorem sales tax on final consumption of commodity j, $j \varepsilon G$

et_j : ad valorem export tax on good j, $j \varepsilon M$

s_i : ad valorem subsidy applied to domestic producer's price, $i \varepsilon M$

rs_j : ad valorem capital subsidy, $j \varepsilon N$

ws_j : ad valorem wage subsidy, $j \varepsilon N$

τ_i : domestic ad valorem tariff, $i \varepsilon G$

τ_i^* : foreign ad valorem tariff, $i \varepsilon M$

Prices

q_i^* : foreign producers' price, $i \varepsilon G$

r : foreign rental rate on capital

Bop : balance of payments deficit on current account

ψ : share of domestic owned capital

Endowments

L_e : aggregate endowment of labour

K_e : aggregate (domestic) endowment of capital

ENDOGENOUS DATA

qs_i : domestic final demand price of foreign good i

$qs_i \equiv (1 + t_i)(1 + \tau_j)q_i^*$

p_{ij}^* : price paid by domestic producer in industry i for foreign good j

$$p_{ij}^* = (1 + t_{ij})(1 + \tau_j^*)q_j^*$$

p_i : domestic producer of good i, $i \varepsilon M$

p_i' : foreign consumer price of domestic good i

$p_i' = (1 + et_i)(1 + \tau_i^*)p_i$

q_i : domestic final demand price of domestic good i

$q_i = (1 + t_i)p_i$

X_i	:	total output in industry i
M_i	:	imports of commodity i
E_i	:	exports of commodity i
IN_{ij}	:	intermediate demand for domestic good j by industry i
IN_j	:	total intermediate demand for domestic good j $IN_j = \sum_{i \varepsilon M} IN_{ij}$
IN^*_{ij}	:	intermediate demand for foreign good j by industry i
IN^*_j	:	total intermediate demand for foreign good j
C_i	:	final consumption demand for domestic good i
C^*_i	:	final consumption demand for foreign good i
f_i	:	number of firms in industry $i\varepsilon N$
δ_i	:	net mark-up on unit cost in industry $i\varepsilon N$
v_i	:	unit variable cost in industry i [$p_i = \delta_i v_i i\varepsilon N$]
Fc_i	:	fixed cost per firm in industry i, $i\varepsilon N$
G_i	:	plant fixed costs per firm in industry i, $i\varepsilon N$
H_i	:	product fixed costs per firm in industry i, $i\varepsilon N$
Fk_i	:	total fixed capital per firm in industry i, $i\varepsilon N$
Fl_i	:	total fixed labour per firm in industry i, $i\varepsilon N$
k_i	:	# of production lines per firm in industry i, $i\varepsilon N$
z_i	:	length of production run each firm in industry $i\varepsilon N$
y_i	:	total output per firm in industry $i\varepsilon N$
n_i	:	# of domestic products in industry $i\varepsilon N$
n^*_i	:	# of foreign competing products in industry $i\varepsilon N$
π_i	:	pure profit per firm in industry $i\varepsilon N$ $\pi_i = (1 + s_i)p_i y_i - Fc_i$
L_i	:	labour employed in industry i
K_i	:	capital employed in industry i
w	:	equilibrium wage rate
K_f	:	(net) capital service inflow from abroad $K_f = \sum_{j\varepsilon M} K_j - K_e$
K	:	total capital in use $K = \sum_{j\varepsilon m} K_j$

EQUILIBRIUM SUMMARY STATISTICS

Given an equilibrium data set described above we derive the following summary

descriptive statistics.

1. Gov : government revenue exclusive of factor taxes

Gov = sales tax revenue + intermediate tax revenue + tariff revenue + export tax revenue - subsidy payments

$$Gov = \sum_{i\varepsilon M} t_i p_i C_i + \sum_{i\varepsilon G} t_i(1 + \tau_i) q_i^* C_i^* \qquad \text{(sales tax)}$$

$$+ \sum_{i\varepsilon G} \tau_i q_i^* M_i \qquad \text{(tariff revenue)}$$

$$+ \sum_{i\varepsilon M} et_i p_i E_i \qquad \text{(export tax revenue)}$$

$$- \sum s_i p_i X_i \qquad \text{(subsidy payments)}$$

$$+ \sum_{i\varepsilon M} \sum_{j\varepsilon M} t_{ij} p_j IN_{ij} + \sum_{i\varepsilon M} \sum_{j\varepsilon G} t_{ij}(1 + \tau_j) q_j^* IN_{ij}^* \qquad \text{(intermediate good taxation)}$$

2. Y ≡ national income (also net disposable income to domestic consumers)
3. Aprof ≡ aggregate pure profits

$$Aprof \equiv \sum_{i\varepsilon N} f_i \pi_i$$

$$Y = wL_e + rK_e + Bop + \psi Aprof + Gov$$

4. GNE ≡ aggregate expenditure by domestic consumers

$$GNE = \sum_{i\varepsilon M} q_i C_i + \sum_{i\varepsilon G} qs_i C_i^* \quad (= GNP\ also)$$

DERIVED COST MEASURES

5. Ac_i ≡ average cost per unit output in industry $i\varepsilon N$

$$Ac_i = v_i + (Fc_i / y_i)$$

6. Fv_i ≡ fixed/variable cost ratio in industry $i\varepsilon N$

$$Fv_i = Fc_i / (v_i y_i)$$

7. Mes_i: minimum efficient scale in industry $i \varepsilon N$

$Mes_i \equiv x$ such that $AC(x) = 1.01\ v_i$, i.e. that level of output at which average cost is within 1 per cent of minimum average cost.

8. Om_i : output$_i$/MES$_i$ ratio in industry $i \varepsilon N$

$Om_i = y_i/MES_i$

9. Sc_i : observed cost elasticity or local measure of scale economies

$Sc_i \equiv v_i/Ac_i$

10. KF $\equiv$ total fixed capital

$KF \equiv \sum_{i \varepsilon N} f_i Fk_i$

11. LF $\equiv$ total fixed labour

$LF \equiv \sum_{i \varepsilon N} fi^{Fl}_i$

12. Kr : fixed capital/total capital ratio

$Kr = KF/K$

13. Lr : fixed labour/total labour ratio

$Lr = LF/L_e$

14. Wb : wage bill

$Wb = wL_e$

15. Kb : capital bill

$Kb = rK$

16. Vkm : payments for capital services provided from abroad

$Vkm = r \cdot K_f$

17. GDP : gross domestic product

$GDP = GNE + Vkm$

18. DEF : GNP deflator

$$DEF = \frac{\sum_{i\varepsilon M} q_i\bar{C}_i + \sum_{i\varepsilon G} qs_i\bar{C}^*_i}{\sum_{i\varepsilon M} \bar{q}_i\bar{C}_i + \sum_{i\varepsilon G} \bar{q}\bar{s}_i\bar{C}^*_i}$$

Note: all barred variables denote 1976 base values.

19. GNP = real GNP in 1976 constant dollars

$$GNP \equiv GNE/DEF$$

PRODUCTIVITY INDEXES

20. Tf_i : total factor productivity index for industry i

$$\log \Gamma_i \equiv \sum_{j\varepsilon M} \bar{o}_{ij} \log IN_{ij} + \sum_{j\varepsilon G} \bar{o}^*_{ij} \log IN^*_{ij}$$

$$+ \bar{o}_{iL} \log L_i + \bar{o}_{iK} \log K_i$$

$$Tf_i \equiv X_i/\Gamma_i$$

$$\bar{o}_{ij} = \bar{IN}_{ij}/\bar{X}_i \qquad \bar{o}^*_{ij} \equiv \bar{IN}^*_{ij}/\bar{X}_i$$

21. Lp_i : labour productivity index (output per unit labour) in industry

$$Lp_i = X_i/L_i$$

22. Va_i : value added in industry i

$$Va_i = p_iX_i - \sum_{j\varepsilon M} (1 + t_{ij})p_jIN_{ij} - \sum_{j\varepsilon G} (1 + t_{ij})(1 + \tau_j)q^*_jIN^*_{ij}$$

$$+ s_ip_iX_i$$

23. Vau_i : value added per unit output

$$Vau_i \equiv Va_i/X_i$$

AGGREGATE PRODUCTIVITY INDEXES

24. AL_p : aggregate labour productivity index

$$w^1_i \equiv X_i/(\sum_{j\varepsilon M} X_j) \qquad \sum_{j\varepsilon M} w^1_i = 1$$

$$AL_p = \sum_{j\varepsilon M} w_i^1 Lp_i$$ [weighted by output shares evaluated at base prices]

25. ATf : aggregate total factor productivity index

$$ATf \equiv \sum_{j\varepsilon M} w_i^1 Tf_i$$

COST EFFICIENCY INDEXES

Let $w_i^2 = X_i / \sum_{j\varepsilon N} X_j$ $\sum_{i\varepsilon N} w_i^2 = 1$

Note: all barred values denote 1976 base values.

26. g_i : average plant fixed costs in industry i

$$g_i \equiv G_i / y_i$$

27. h_i : average product fixed costs in industry i

$$H_i \equiv H_i / y_i$$

28. Ag : aggregate index of plant fixed costs

$$Ag \equiv \sum_{i\varepsilon N} w_i^2 h_i$$

29. Ah : aggregate index of product fixed costs

$$Ah \equiv \sum_{i\varepsilon N} w_i^2 h_i$$

30. Az : aggregate index of length of production runs in plant

$$Az \equiv \sum_{i\varepsilon N} w_i^2 z_i$$

31. $Intra_i$: Balassa-Grubel-Lloyd intra-industry trade index for industry i

$$Intra_i = 1 - \frac{p_i E_i - q_i \overset{*}{M}_i}{p_i E_i + q_i \overset{*}{M}_i}$$

32. $Tvol_i$: trade volume in industry i

$$Tvol_i = p_i E_i + q_i \overset{*}{M}_i$$

33. Agtra: aggregate index of intra-industry trade

$$Agtra = \sum_{i \varepsilon M} w_i^3 \, Intra_i$$

$$w_i^3 = Tvol_i / \sum_{j \varepsilon M} Tvol_i \qquad \sum_{i \varepsilon M} w_i^3 = 1$$

34. Agint: index of interindustry trade

$$Agint = 1 - Agtra$$

35. Vam : total value added in manufacturing

$$Vam = \sum_{i \varepsilon N} Va_i$$

36. Lm : total employment in manufacturing

$$Lm = \sum_{i \varepsilon N} L_i$$

TERMS-OF-TRADE INDEXES

For our purposes here, the economy is divided into primary sectors and other. 'Primary' includes agriculture, forestry, fishing and mining.

Let P index primary and 0 other. $P \cup 0 = G$.

Define

$$\bar{e}_i = \bar{E}_i / \sum_{i \varepsilon M} \bar{E}_i \qquad i \varepsilon M$$

$$\bar{m}_i = \bar{M}_i / \sum_{i \varepsilon G} \bar{M}_i \qquad i \varepsilon G$$

$$\bar{\bar{ep}}_i = \bar{E}_i / \sum_{i \varepsilon P} \bar{E}_i \qquad i \varepsilon P$$

$$\bar{\bar{mp}}_i = \bar{M}_i / \sum_{i \varepsilon P} \bar{M}_i \qquad i \varepsilon P$$

$$\bar{\bar{eo}}_i = \bar{E}_i / \sum_{i \varepsilon 0} \bar{E}_i \qquad i \varepsilon 0$$

$$\bar{\bar{mo}}_i = \bar{M}_i / \sum_{i \varepsilon 0} \bar{M}_i \qquad i \varepsilon 0$$

37. TOT : terms of trade (total)

$$TOT = \frac{\Sigma_{i \varepsilon M} \, p_i \bar{e}_i}{\Sigma_{i \varepsilon G} \, q_i^* \bar{m}_i}$$

38. TOTP: terms of trade (primary)

$$\mathrm{TOTP} = \frac{\Sigma_{i\varepsilon P} p_i \bar{e}\bar{P}_i}{\Sigma_{i\varepsilon P} q_i^* \bar{m}\bar{P}_i}$$

39. TOTO: Terms of trade in non-primary sectors

$$\mathrm{TOTO} = \frac{\sum_{i\varepsilon 0} p_i \bar{e}\bar{o}_i}{\sum_{i\varepsilon 0} q_i^* \bar{m}\bar{o}_i}$$

Appendix D
Selective tariff cuts: industry results

TABLE D4.1
Tariff reduction - tariff reduction experiment for industry 1 - FOOD AND BEVERAGE with an import tariff of 0.1426 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	16775.7789 6668.3711	18669.1248 7420.9766	0.11286
Consumer Price	1.1651	1.0817	-0.07158
Value-Added	4793.2376 1905.3118	4235.1824 1683.4849	-0.11643
Employment	2705.0275 1075.2483	2652.6074 1054.4114	-0.01938
Capital Requirements	21237.8727	16330.1797	-0.23108
No. of Firms	1775.5443 705.7788	1365.2477 542.6858	-0.23108
Mark-Up	0.2173	0.1519	-0.30104
Unit Cost	0.8296	0.8139	-0.01885
Average Fixed Cost	0.1847	0.1277	-0.30854
Length of Production Run	4.7241	6.8373	0.44731
Scale Elasticity	0.8179	0.8644	0.05681
Kap / Lab Ratio	7.8513	6.1563	-0.21589
Labour Productivity	6.2017	7.0380	0.13485
Total Factor Productivity	8.7406	9.1461	0.04639
Exports	1512.9224 601.3865	2296.0278 912.6709	0.51761
Imports	1641.0919 652.3340	2420.3842 962.1025	0.47486
Final Consumption	9681.8926 3848.5522	9879.3414 3927.0381	0.02039
Domestic Intermediate Use	5595.7784 2224.3218	6340.9494 2520.5273	0.13317
Intra-Ind. Trade Index	0.9594	0.9736	0.01487

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.2
Tariff reduction - tariff reduction experiment for industry 2 - TOBACCO with an import tariff of 0.3069 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	841.8869 465.0581	1064.9793 588.2944	0.26499
Consumer Price	2.1959	1.8952	-0.13692
Value-Added	280.5695 154.9866	233.2730 128.8600	-0.16857
Employment	173.3613 95.7648	173.6859 95.9441	0.00187
Capital Requirements	1107.8201	654.1065	-0.40956
No. of Firms	56.7507 31.3491	33.5081 18.5099	-0.40956
Mark-Up	0.2582	0.1280	-0.50427
Unit Cost	0.8164	0.7860	-0.03728
Average Fixed Cost	0.2053	0.0958	-0.53322
Length of Production Run	7.4174	15.8914	1.14244
Scale Elasticity	0.7991	0.8913	0.11546
Kap / Lab Ratio	6.3902	3.7660	-0.41066
Labour Productivity	4.8563	6.1316	0.26263
Total Factor Productivity	7.9207	8.5655	0.08141
Exports	58.5980 32.3695	125.0756 69.0918	1.13447
Imports	22.7014 12.5403	54.2291 29.9562	1.38880
Final Consumption	622.8484 344.0613	695.7426 384.3281	0.11703
Domestic Intermediate Use	161.9951 89.4861	228.1637 126.0376	0.40846
Intra-Ind. Trade Index	0.5585	0.6049	0.08312

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.3
Tariff reduction - tariff reduction experiment for industry 3 - RUBBER AND PLASTIC with an import tariff of 0.0987 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	2343.0204	2627.4712	0.12140
	1498.5957	1680.5305	
Consumer Price	1.0820	1.0332	-0.04508
Value-Added	926.3810	922.5324	-0.00415
	592.5132	590.0515	
Employment	706.2784	745.9150	0.05612
	451.7356	477.0872	
Capital Requirements	2448.2814	2029.1540	-0.17119
No. of Firms	313.8995	260.1622	-0.17119
	200.7701	166.3997	
Mark-Up	0.2147	0.1612	-0.24921
Unit Cost	0.8270	0.8261	-0.00108
Average Fixed Cost	0.1694	0.1253	-0.25997
Length of Production Run	3.7321	5.0497	0.35303
Scale Elasticity	0.8300	0.8683	0.04609
Kap / Lab Ratio	3.4665	2.7204	-0.21523
Labour Productivity	3.3174	3.5225	0.06181
Total Factor Productivity	8.9304	9.3353	0.04534
Exports	348.7674	604.4095	0.73299
	223.0717	386.5801	
Imports	1071.2525	1298.9130	0.21252
	685.1729	830.7847	
Final Consumption	472.5799	383.1246	-0.18929
	302.2620	245.0465	
Domestic Intermediate Use	1523.2422	1614.2515	0.05975
	974.2656	1032.4751	
Intra-Ind. Trade Index	0.4912	0.6351	0.29294

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.4

Tariff reduction - tariff reduction experiment for industry 4 - LEATHER with an import tariff of 0.1657 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	455.4213 240.1436	400.5501 211.2101	-0.12048
Consumer Price	1.1225	1.0346	-0.07826
Value-Added	230.1424 121.3540	172.5391 90.9798	-0.25029
Employment	193.5392 102.0532	152.5412 80.4350	-0.21183
Capital Requirements	444.9769	267.7300	-0.39833
No. of Firms	1219.7109 643.1533	526.5059 277.6265	-0.56834
Mark-Up	0.1456	0.0759	-0.47843
Unit Cost	0.9596	0.9418	-0.01858
Average Fixed Cost	0.1328	0.0651	-0.50943
Length of Production Run	0.1867	0.3804	1.03750
Scale Elasticity	0.8785	0.9353	0.06471
Kap / Lab Ratio	2.2992	1.7551	-0.23662
Labour Productivity	2.3531	2.6258	0.11590
Total Factor Productivity	8.8088	9.2593	0.05114
Exports	25.1177 13.2446	47.9182 25.2673	0.90774
Imports	451.2116 237.9239	632.8819 333.7185	0.40263
Final Consumption	296.3051 156.2417	211.4753 111.5109	-0.28629
Domestic Intermediate Use	136.2688 71.8545	141.7871 74.7643	0.04050
Intra-Ind. Trade Index	0.1055	0.1408	0.33477

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.5
Tariff reduction - tariff reduction experiment for industry 5 - TEXTILES with an import tariff of 0.1714 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	1993.9185 906.4353	2244.5042 1020.3516	0.12567
Consumer Price	1.1838	1.0840	-0.08426
Value-Added	894.0876 406.4521	845.2349 384.2437	-0.05464
Employment	610.4017 277.4885	627.5400 285.2795	0.02808
Capital Requirements	3006.3032	2361.0491	-0.21463
No. of Firms	519.2180 236.0365	268.2750 121.9578	-0.48331
Mark-Up	0.1287	0.0662	-0.48542
Unit Cost	0.9691	0.9394	-0.03062
Average Fixed Cost	0.1139	0.0524	-0.54046
Length of Production Run	1.9201	4.1832	1.17863
Scale Elasticity	0.8948	0.9472	0.05857
Kap / Lab Ratio	4.9251	3.7624	-0.23608
Labour Productivity	3.2666	3.5767	0.09493
Total Factor Productivity	8.2709	8.7534	0.05833
Exports	173.5444 78.8933	326.3949 148.3791	0.88076
Imports	1552.0512 705.5623	2019.2054 917.9307	0.30099
Final Consumption	495.9018 225.4370	396.0482 180.0435	-0.20136
Domestic Intermediate Use	1339.3475 608.8672	1522.5781 692.1638	0.13681
Intra-Ind. Trade Index	0.2011	0.2783	0.38362

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.6
Tariff reduction - tariff reduction experiment for industry 6 - KNITTING MILLS with an import tariff of 0.3324 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	416.2433 111.0953	312.0997 83.2994	-0.25020
Consumer Price	1.1100	0.9743	-0.12227
Value-Added	211.9988 56.5825	117.8240 31.4472	-0.44422
Employment	172.6344 46.0761	108.7633 29.0289	-0.36998
Capital Requirements	461.0133	152.0294	-0.67023
No. of Firms	1786.4266 476.7971	1.0000 0.2669	-0.99944
Mark-Up	0.1364	0.0018	-0.98657
Unit Cost	0.9724	0.9681	-0.00440
Average Fixed Cost	0.1267	0.0001	-0.99925
Length of Production Run	0.1165	156.0499	*********
Scale Elasticity	0.8847	0.9999	0.13018
Kap / Lab Ratio	2.6705	1.3978	-0.47657
Labour Productivity	2.4111	2.8695	0.19012
Total Factor Productivity	5.5045	6.1134	0.11063
Exports	8.8804 2.3702	23.0418 6.1499	1.59467
Imports	325.1761 86.7895	604.4220 161.3202	0.85875
Final Consumption	268.0417 71.5403	128.3266 34.2504	-0.52124
Domestic Intermediate Use	140.1652 37.4101	160.0169 42.7085	0.14163
Intra-Ind. Trade Index	0.0532	0.0734	0.38138

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.7
Tariff reduction - tariff reduction experiment for industry 7 - CLOTHING with an import tariff of 0.3244 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	2174.0773 469.8179	1477.3465 319.2544	-0.32047
Consumer Price	1.0418	0.9077	-0.12870
Value-Added	983.8587 212.6118	483.8817 104.5668	-0.50818
Employment	947.4243 204.7384	494.8614 106.9395	-0.47768
Capital Requirements	818.9478	183.8746	-0.77547
No. of Firms	1536.6269 332.0649	345.0118 74.5570	-0.77547
Mark-Up	0.2129	0.0726	-0.65880
Unit Cost	0.8587	0.8460	-0.01479
Average Fixed Cost	0.1799	0.0590	-0.67196
Length of Production Run	0.7074	2.1410	2.02651
Scale Elasticity	0.8268	0.9348	0.13066
Kap / Lab Ratio	0.8644	0.3716	-0.57014
Labour Productivity	2.2947	2.9854	0.30097
Total Factor Productivity	8.4904	9.5036	0.11933
Exports	68.6147 14.8276	280.6007 60.6378	3.08951
Imports	694.2296 150.0230	1991.8069 430.4294	1.86909
Final Consumption	1916.2273 414.0967	985.5272 212.9724	-0.48569
Domestic Intermediate Use	191.9675 41.4842	182.5961 39.4590	-0.04882
Intra-Ind. Trade Index	0.1799	0.2470	0.37284

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.8
Tariff reduction - tariff reduction experiment for industry 8 - WOOD with an import tariff of 0.0627 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	5276.5160 776.1753	5995.9719 882.0073	0.13635
Consumer Price	1.0342	1.0026	-0.03059
Value-Added	1930.3990 283.9617	2026.2107 298.0554	0.04963
Employment	1335.1390 196.3989	1448.2090 213.0315	0.08469
Capital Requirements	6332.5533	6163.8777	-0.02664
No. of Firms	814.7452 119.8490	793.0434 116.6567	-0.02664
Mark-Up	0.2566	0.2219	-0.13519
Unit Cost	0.7807	0.7783	-0.00307
Average Fixed Cost	0.1928	0.1654	-0.14207
Length of Production Run	3.2381	3.7804	0.16745
Scale Elasticity	0.8019	0.8247	0.02840
Kap / Lab Ratio	4.7430	4.2562	-0.10263
Labour Productivity	3.9520	4.1403	0.04763
Total Factor Productivity	6.4294	6.5967	0.02603
Exports	2185.2450 321.4495	2640.3265 388.3918	0.20825
Imports	402.6484 59.2296	449.0009 66.0480	0.11512
Final Consumption	217.8892 32.0515	217.2162 31.9525	-0.00309
Domestic Intermediate Use	2831.1037 416.4553	3002.4053 441.6538	0.06051
Intra-Ind. Trade Index	0.3112	0.2907	-0.06588

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.9
Tariff reduction - tariff reduction experiment for industry 9 - FURNITURE AND FIXTURES with an import tariff of 0.1581 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	1164.6704 614.7129	1031.6898 544.5259	-0.11418
Consumer Price	1.1860	1.1050	-0.06830
Value-Added	597.6987 315.4653	456.7297 241.0619	-0.23585
Employment	515.0652 271.8513	413.2875 218.1331	-0.19760
Capital Requirements	1043.8085	631.4599	-0.39504
No. of Firms	1628.4961 859.5200	834.3498 440.3696	-0.48766
Mark-Up	0.1891	0.1124	-0.40563
Unit Cost	0.9024	0.8988	-0.00406
Average Fixed Cost	0.1624	0.0938	-0.42223
Length of Production Run	0.3576	0.6183	0.72896
Scale Elasticity	0.8475	0.9055	0.06843
Kap / Lab Ratio	2.0266	1.5279	-0.24606
Labour Productivity	2.2612	2.4963	0.10397
Total Factor Productivity	10.6048	11.1853	0.05474
Exports	39.8106 21.0120	77.3403 40.8202	0.94270
Imports	348.7746 184.0832	652.9063 344.6038	0.87200
Final Consumption	965.5356 509.6096	784.4697 414.0430	-0.18753
Domestic Intermediate Use	162.0349 85.5220	169.8627 89.6535	0.04831
Intra-Ind. Trade Index	0.2049	0.2118	0.03377

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.10
Tariff reduction - tariff reduction experiment for industry 10 - PAPER AND ALLIED PRODUCTS with an import tariff of 0.1005 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	5963.9675 1782.6299	7190.5104 2149.2434	0.20566
Consumer Price	1.1689	1.1180	-0.04348
Value-Added	2807.9683 839.3015	3073.3015 918.6096	0.09449
Employment	1640.2393 490.2673	1897.9037 567.2832	0.15709
Capital Requirements	11937.1586	12006.1444	0.00578
No. of Firms	438.8499 131.1722	366.2279 109.4655	-0.16548
Mark-Up	0.1558	0.1110	-0.28712
Unit Cost	0.9306	0.9259	-0.00498
Average Fixed Cost	0.1360	0.0942	-0.30687
Length of Production Run	6.7950	9.8170	0.44474
Scale Elasticity	0.8725	0.9076	0.04024
Kap / Lab Ratio	7.2777	6.3260	-0.13077
Labour Productivity	3.6360	3.7887	0.04198
Total Factor Productivity	6.8556	7.1294	0.03994
Exports	2764.8852 826.4241	3642.0974 1088.6228	0.31727
Imports	724.8558 216.6594	879.8120 262.9756	0.21377
Final Consumption	431.7872 129.0612	401.5026 120.0091	-0.07014
Domestic Intermediate Use	2961.4145 885.1667	3248.6684 971.0269	0.09700
Intra-Ind. Trade Index	0.4154	0.3891	-0.06328

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.11
Tariff reduction - tariff reduction experiment for industry 11 - PRINTING AND PUBLISHING with an import tariff of 0.0556 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	3407.5770 1668.0088	3523.6759 1724.8391	0.03407
Consumer Price	0.9739	0.9459	-0.02870
Value-Added	1722.5632 843.1946	1688.4136 826.4783	-0.01982
Employment	1443.5547 706.6199	1445.2756 707.4622	0.00119
Capital Requirements	3376.6068	3031.8447	-0.10210
No. of Firms	1287.9029 630.4282	1156.4040 566.0596	-0.10210
Mark-Up	0.2602	0.2274	-0.12603
Unit Cost	0.7680	0.7658	-0.00275
Average Fixed Cost	0.1936	0.1681	-0.13154
Length of Production Run	1.3229	1.5235	0.15166
Scale Elasticity	0.7987	0.8200	0.02670
Kap / Lab Ratio	2.3391	2.0978	-0.10317
Labour Productivity	2.3605	2.4381	0.03284
Total Factor Productivity	5.4869	5.6185	0.02398
Exports	139.0864 68.0828	184.2816 90.2058	0.32494
Imports	402.8952 197.2172	463.7746 227.0177	0.15110
Final Consumption	1023.7717 501.1362	1014.5240 496.6094	-0.00903
Domestic Intermediate Use	2240.0903 1096.5242	2313.1106 1132.2676	0.03260
Intra-Ind. Trade Index	0.5133	0.5687	0.10807

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.12
Tariff reduction - tariff reduction experiment for industry 12 - PRIMARY METALS with an import tariff of 0.0557 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	8090.9181 5188.7031	9909.0617 6354.6797	0.22471
Consumer Price	1.5967	1.5546	-0.02641
Value-Added	2558.2964 1640.6353	2884.6285 1849.9121	0.12756
Employment	1628.3703 1044.2737	1923.6097 1233.6108	0.18131
Capital Requirements	9666.1717	9923.4517	0.02662
No. of Firms	118.2894 75.8590	121.4379 77.8781	0.02662
Mark-Up	0.1884	0.1598	-0.15164
Unit Cost	0.8603	0.8582	-0.00243
Average Fixed Cost	0.1537	0.1291	-0.16003
Length of Production Run	34.1997	40.7989	0.19296
Scale Elasticity	0.8484	0.8692	0.02454
Kap / Lab Ratio	5.9361	5.1588	-0.13095
Labour Productivity	4.9687	5.1513	0.03674
Total Factor Productivity	6.7907	6.9994	0.03073
Exports	2294.3769 1471.3838	3592.9434 2304.1545	0.56598
Imports	1260.6824 808.4756	1405.1035 901.0928	0.11456
Final Consumption	3.8557 2.4727	2.6791 1.7181	-0.30516
Domestic Intermediate Use	5842.7567 3746.9597	6296.5215 4037.9592	0.07766
Intra-Ind. Trade Index	0.7092	0.5623	-0.20723

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.13
Tariff reduction - tariff reduction experiment for industry 13 - METAL FABRICATING with an import tariff of 0.0870 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	6753.7112 4075.1892	7407.4509 4469.6523	0.09680
Consumer Price	1.0821	1.0367	-0.04198
Value-Added	3072.1537 1853.7373	3077.0724 1856.7053	0.00160
Employment	2423.6437 1462.4265	2508.6859 1513.7410	0.03509
Capital Requirements	7384.0442	6545.3509	-0.11358
No. of Firms	3038.2698 1833.2920	2528.2470 1525.5442	-0.16787
Mark-Up	0.1930	0.1490	-0.22832
Unit Cost	0.8514	0.8469	-0.00523
Average Fixed Cost	0.1582	0.1203	-0.23960
Length of Production Run	1.1114	1.4649	0.31805
Scale Elasticity	0.8433	0.8756	0.03834
Kap / Lab Ratio	3.0467	2.6091	-0.14363
Labour Productivity	2.7866	2.9527	0.05962
Total Factor Productivity	7.0012	7.2200	0.03125
Exports	719.6038 434.2087	1218.4630 735.2205	0.69324
Imports	2185.7996 1318.9114	2649.2966 1598.5854	0.21205
Final Consumption	1081.1364 652.3577	881.2583 531.7512	-0.18488
Domestic Intermediate Use	4964.1052 2995.3411	5274.0174 3182.3420	0.06243
Intra-Ind. Trade Index	0.4954	0.6301	0.27194

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.14
Tariff reduction - tariff reduction experiment for industry 14 - MACHINERY with an import tariff of 0.0502 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	2678.4349 1773.9272	2823.1597 1869.7786	0.05403
Consumer Price	1.0861	1.0580	-0.02582
Value-Added	1244.6664 824.3425	1245.4025 824.8301	0.00059
Employment	1020.1497 675.6450	1039.5569 688.4985	0.01902
Capital Requirements	2645.6770	2479.8073	-0.06269
No. of Firms	988.9528 654.9834	887.4589 587.7639	-0.10263
Mark-Up	0.1703	0.1467	-0.13872
Unit Cost	0.8949	0.8898	-0.00575
Average Fixed Cost	0.1460	0.1243	-0.14870
Length of Production Run	1.3542	1.5906	0.17458
Scale Elasticity	0.8598	0.8775	0.02058
Kap / Lab Ratio	2.5934	2.3854	-0.08019
Labour Productivity	2.6255	2.7157	0.03436
Total Factor Productivity	9.4004	9.5549	0.01643
Exports	696.3384 461.1848	1004.9451 665.5750	0.44319
Imports	4695.4700 3109.8096	5173.5664 3426.4529	0.10182
Final Consumption	936.5277 620.2622	726.7444 481.3228	-0.22400
Domestic Intermediate Use	1077.0273 713.3152	1111.4431 736.1086	0.03195
Intra-Ind. Trade Index	0.2583	0.3253	0.25943

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.15
Tariff reduction - tariff reduction experiment for industry 15 - TRANSPORTATION EQUIPMENT with an import tariff of 0.0597 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	23867.5728 19122.6992	41513.0690 33260.2695	0.73931
Consumer Price	1.0486	1.0113	-0.03551
Value-Added	5763.1671 4617.4492	9009.6251 7218.5078	0.56331
Employment	2978.4380 2386.3245	4583.7597 3672.5081	0.53898
Capital Requirements	28001.2079	41872.7500	0.49539
No. of Firms	453.7257 363.5249	678.4973 543.6118	0.49539
Mark-Up	0.2640	0.2359	-0.10657
Unit Cost	0.7650	0.7546	-0.01355
Average Fixed Cost	0.1987	0.1748	-0.12006
Length of Production Run	26.3018	30.5919	0.16311
Scale Elasticity	0.7938	0.8119	0.02277
Kap / Lab Ratio	9.4013	9.1350	-0.02832
Labour Productivity	8.0135	9.0566	0.13017
Total Factor Productivity	11.1492	11.4887	0.03045
Exports	15645.9895 12535.5664	30663.6035 24567.6758	0.95984
Imports	9955.5703 7976.4023	16191.2533 12972.4297	0.62635
Final Consumption	5022.2397 4023.8184	4426.1452 3546.2275	-0.11869
Domestic Intermediate Use	2664.7578 2135.0039	4208.1955 3371.6062	0.57920
Intra-Ind. Trade Index	0.7777	0.6911	-0.11136

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.16
Tariff reduction - tariff reduction experiment for industry 16 - ELECTRICAL PRODUCTS with an import tariff of 0.1038 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	4043.6264 2710.8469	4096.2396 2746.1189	0.01301
Consumer Price	1.1418	1.0832	-0.05131
Value-Added	2066.6396 1385.4751	1897.1284 1271.8347	-0.08202
Employment	1626.4676 1090.3838	1548.0406 1037.8064	-0.04822
Capital Requirements	5001.7634	4108.4925	-0.17859
No. of Firms	2325.7940 1559.2122	1652.4877 1107.8276	-0.28950
Mark-Up	0.1704	0.1226	-0.28072
Unit Cost	0.9011	0.8913	-0.01088
Average Fixed Cost	0.1471	0.1031	-0.29891
Length of Production Run	0.8693	1.2394	0.42576
Scale Elasticity	0.8597	0.8963	0.04261
Kap / Lab Ratio	3.0752	2.6540	-0.13698
Labour Productivity	2.4861	2.6461	0.06433
Total Factor Productivity	8.8182	9.1054	0.03258
Exports	437.0124 292.9729	673.9378 451.8079	0.54215
Imports	2617.9678 1755.0854	3290.6678 2206.0637	0.25696
Final Consumption	1792.0607 1201.3975	1481.8179 993.4106	-0.17312
Domestic Intermediate Use	1837.2129 1231.6675	1940.8663 1301.1567	0.05642
Intra-Ind. Trade Index	0.2861	0.3400	0.18832

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.17
Tariff reduction - tariff reduction experiment for industry 17 - NON-METALLIC MINERAL PRODUCTION with an import tariff of 0.0757 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	3532.7637 1684.7749	4061.7685 1937.0574	0.14974
Consumer Price	0.9866	0.9465	-0.04071
Value-Added	1406.7145 670.8621	1479.9722 705.7986	0.05208
Employment	841.5868 401.3525	929.9295 443.4832	0.10497
Capital Requirements	5802.1720	5678.6835	-0.02128
No. of Firms	410.8324 195.9260	402.0886 191.7560	-0.02128
Mark-Up	0.3266	0.2812	-0.13895
Unit Cost	0.6964	0.6917	-0.00672
Average Fixed Cost	0.2201	0.1875	-0.14823
Length of Production Run	4.2995	5.0508	0.17474
Scale Elasticity	0.7598	0.7867	0.03543
Kap / Lab Ratio	6.8943	6.1066	-0.11426
Labour Productivity	4.1977	4.3678	0.04052
Total Factor Productivity	7.1400	7.4090	0.03767
Exports	508.0084 242.2692	796.2606 379.7366	0.56742
Imports	466.0102 222.2402	518.7455 247.3897	0.11316
Final Consumption	245.6371 117.1443	243.1862 115.9755	-0.00998
Domestic Intermediate Use	2737.2681 1305.4031	2920.1543 1392.6216	0.06681
Intra-Ind. Trade Index	0.9569	0.7890	-0.17549

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.18
Tariff reduction - tariff reduction experiment for industry 18 - PETROLEUM AND COAL with an import tariff of 0.0278 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	6217.8022 1866.5840	6304.1747 1892.5132	0.01389
Consumer Price	1.6242	1.6059	-0.01127
Value-Added	951.1030 285.5210	879.7732 264.1079	-0.07500
Employment	318.9042 95.7350	317.0012 95.1638	-0.00597
Capital Requirements	6178.1595	5514.7623	-0.10738
No. of Firms	81.2425 24.3890	58.8468 17.6658	-0.27567
Mark-Up	-0.0871	-0.0972	0.11655
Unit Cost	1.1572	1.1570	-0.00016
Average Fixed Cost	0.0469	0.0335	-0.28556
Length of Production Run	38.2669	53.5643	0.39976
Scale Elasticity	0.9611	0.9719	0.01124
Kap / Lab Ratio	19.3731	17.3967	-0.10202
Labour Productivity	19.4974	19.8869	0.01998
Total Factor Productivity	3.3171	3.3565	0.01188
Exports	325.0272 97.5732	344.3419 103.3714	0.05942
Imports	187.3760 56.2503	199.9229 60.0168	0.06696
Final Consumption	2646.0746 794.3516	2670.2222 801.6006	0.00913
Domestic Intermediate Use	3264.0475 979.8669	3304.2714 991.9421	0.01232
Intra-Ind. Trade Index	0.7314	0.7347	0.00450

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.19
Tariff reduction - tariff reduction experiment for industry 19 - CHEMICAL PRODUCTS with an import tariff of 0.0623 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	4737.7894 2821.3535	5056.2328 3010.9866	0.06721
Consumer Price	1.1152	1.0782	-0.03319
Value-Added	1824.4724 1086.4731	1805.4687 1075.1565	-0.01042
Employment	1058.4889 630.3301	1095.5881 652.4226	0.03505
Capital Requirements	7821.9587	7289.2525	-0.06810
No. of Firms	575.0557 342.4456	503.8120 300.0200	-0.12389
Mark-Up	0.1750	0.1472	-0.15865
Unit Cost	0.8926	0.8839	-0.00979
Average Fixed Cost	0.1434	0.1178	-0.17884
Length of Production Run	4.1194	5.0180	0.21813
Scale Elasticity	0.8616	0.8824	0.02420
Kap / Lab Ratio	7.3897	6.6533	-0.09966
Labour Productivity	4.4760	4.6151	0.03108
Total Factor Productivity	7.7465	7.9509	0.02639
Exports	541.0567 322.1992	765.9030 456.0950	0.41557
Imports	1739.6450 1035.9585	1985.4137 1182.3137	0.14128
Final Consumption	1061.6471 632.2107	984.1615 586.0681	-0.07299
Domestic Intermediate Use	3160.2862 1881.9502	3316.7749 1975.1394	0.04952
Intra-Ind. Trade Index	0.4745	0.5568	0.17343

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE D4.20
Tariff reduction - tariff reduction experiment for industry 20-MISC.MANUFACTURING with an import tariff of 0.0908 % reduced to 0.00 % (individual industry statistics)

Variable	With Tariff	Without Tariff	Percentage Change
Industry Output	1995.1951	2076.6498	0.04083
	1365.5115	1421.2590	
Consumer Price	1.1055	1.0568	-0.04404
Value-Added	912.2758	863.2480	-0.05374
	624.3616	590.8069	
Employment	786.3784	768.0622	-0.02329
	538.1973	525.6616	
Capital Requirements	1591.0457	1291.4648	-0.18829
No. of Firms	1489.3786	1139.3632	-0.23501
	1019.3306	779.7800	
Mark-Up	0.1396	0.0971	-0.30430
Unit Cost	0.8871	0.8809	-0.00701
Average Fixed Cost	0.1483	0.1090	-0.26505
Length of Production Run	0.6698	0.9113	0.36057
Scale Elasticity	0.8568	0.8899	0.03865
Kap / Lab Ratio	2.0233	1.6815	-0.16893
Labour Productivity	2.5372	2.7038	0.06565
Total Factor Productivity	11.1488	11.5100	0.03240
Exports	310.4587	624.6437	1.01200
	212.4780	427.5061	
Imports	1558.9661	2029.1097	0.30157
	1066.9563	1388.7227	
Final Consumption	933.9750	638.5405	-0.31632
	639.2124	437.0171	
Domestic Intermediate Use	754.1371	791.7952	0.04994
	516.1313	541.9045	
Intra-Ind. Trade Index	0.3321	0.4708	0.41735

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

Appendix E
Industrial policy experiments: individual industry results

TABLE E5.1.1
Export subsidy - export subsidy experiment for industry 1 - FOOD AND BEVERAGE with an import tariff of 14.26 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	16775.7789	26320.8557	0.56898
	6668.3711	10462.5391	
Consumer Price	1.1651	1.1758	0.00920
Value-Added	4205.8598	6622.6249	0.57462
	1671.8291	2632.4932	
Employment	2705.0275	4181.9827	0.54600
	1075.2483	1662.3381	
Capital Requirements	21237.8727	33072.4865	0.55724
No. of Firms	1775.5443	2764.9504	0.55724
	705.7788	1099.0676	
Mark-Up	0.2173	0.2151	-0.01027
Unit Cost	0.8296	0.8387	0.01105
Average Fixed Cost	0.1847	0.1848	0.00083
Length of Production Run	4.7241	4.7597	0.00754
Scale Elasticity	0.8179	0.8194	0.00184
Kap / Lab Ratio	7.8513	7.9083	0.00727
Labour Productivity	9.3755	9.5504	0.01865
Total Factor Productivity	8.7406	8.7505	0.00113
Exports	1512.9224	9640.9557	5.37240
	601.3865	3832.2798	
Imports	1641.0919	1871.3194	0.14029
	652.3340	743.8494	
Final Consumption	9681.8926	9529.1002	-0.01578
	3848.5522	3787.8171	
Domestic Intermediate Use	5595.7784	7332.2357	0.31032
	2224.3218	2914.5635	
Intra-Ind. Trade Index	0.9594	0.3251	-0.66113

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.2
Export subsidy - export subsidy experiment for industry 2 - TOBACCO with an import tariff of 30.69 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	841.8869 465.0581	1189.2821 656.9592	0.41264
Consumer Price	2.1959	2.1932	-0.00119
Value-Added	90.8469 50.1838	126.7969 70.0426	0.39572
Employment	173.3613 95.7648	244.1575 134.8726	0.40837
Capital Requirements	1107.8201	1554.3861	0.40310
No. of Firms	56.7507 31.3491	79.6270 43.9860	0.40310
Mark-Up	0.2582	0.2566	-0.00616
Unit Cost	0.8164	0.8165	0.00008
Average Fixed Cost	0.2053	0.2040	-0.00638
Length of Production Run	7.4174	7.4678	0.00680
Scale Elasticity	0.7991	0.8001	0.00130
Kap / Lab Ratio	6.3902	6.3663	-0.00374
Labour Productivity	7.4029	7.4108	0.00106
Total Factor Productivity	7.9207	7.9267	0.00076
Exports	58.5980 32.3695	345.8069 191.0237	4.90134
Imports	22.7014 12.5403	24.8177 13.7093	0.09322
Final Consumption	622.8484 344.0613	623.7974 344.5857	0.00152
Domestic Intermediate Use	161.9951 89.4861	228.4507 126.1961	0.41023
Intra-Ind. Trade Index	0.5585	0.1339	-0.76019

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.3
Export subsidy - export subsidy experiment for industry 3 - RUBBER AND PLASTIC with an import tariff of 9.87 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	2343.0204 1498.5957	12500.5595 7995.3555	4.33523
Consumer Price	1.0820	1.1092	0.02516
Value-Added	885.7401 566.5193	4854.5338 3104.9597	4.48076
Employment	706.2784 451.7356	3687.9151 2358.7903	4.22162
Capital Requirements	2448.2814	13212.8899	4.39680
No. of Firms	313.8995 200.7701	1694.0532 1083.5164	4.39680
Mark-Up	0.2147	0.2162	0.00704
Unit Cost	0.8270	0.8467	0.02389
Average Fixed Cost	0.1694	0.1747	0.03132
Length of Production Run	3.7321	3.6895	-0.01141
Scale Elasticity	0.8300	0.8290	-0.00123
Kap / Lab Ratio	3.4665	3.5828	0.03355
Labour Productivity	4.1933	4.3229	0.03089
Total Factor Productivity	8.9304	8.9187	-0.00131
Exports	348.7674 223.0717	10667.8404 6823.1484	29.58725
Imports	1071.2525 685.1729	1203.2845 769.6206	0.12325
Final Consumption	472.5799 302.2620	414.5688 265.1582	-0.12275
Domestic Intermediate Use	1523.2422 974.2656	1726.8257 1104.4775	0.13365
Intra-Ind. Trade Index	0.4912	0.2027	-0.58730

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.4
Export subsidy - export subsidy experiment for industry 4 - LEATHER with an import tariff of 16.57 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	455.4213 240.1436	732.6436 386.3228	0.60872
Consumer Price	1.1225	1.1282	0.00514
Value-Added	223.0278 117.6026	362.3706 191.0780	0.62478
Employment	193.5392 102.0532	313.0493 165.0709	0.61750
Capital Requirements	444.9769	730.2877	0.64118
No. of Firms	1219.7109 643.1533	2025.9071 1068.2607	0.66097
Mark-Up	0.1456	0.1500	0.03054
Unit Cost	0.9596	0.9608	0.00126
Average Fixed Cost	0.1328	0.1372	0.03333
Length of Production Run	0.1867	0.1808	-0.03146
Scale Elasticity	0.8785	0.8751	-0.00388
Kap / Lab Ratio	2.2992	2.3328	0.01464
Labour Productivity	2.8532	2.8540	0.00028
Total Factor Productivity	8.8088	8.7831	-0.00292
Exports	25.1177 13.2446	314.4443 165.8065	11.51882
Imports	451.2116 237.9239	473.2969 249.5695	0.04895
Final Consumption	296.3051 156.2417	287.1414 151.4097	-0.03093
Domestic Intermediate Use	136.2688 71.8545	160.9432 84.8653	0.18107
Intra-Ind. Trade Index	0.1055	0.7983	6.56985

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.5
Export subsidy - export subsidy experiment for industry 5 - TEXTILES with an import tariff of 17.14 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	1993.9185 906.4353	3594.7832 1634.1882	0.80287
Consumer Price	1.1838	1.1949	0.00940
Value-Added	862.5293 392.1057	1582.1732 719.2559	0.83434
Employment	610.4017 277.4885	1103.6346 501.7122	0.80805
Capital Requirements	3006.3032	5581.5966	0.85663
No. of Firms	519.2180 236.0365	985.1254 447.8379	0.89733
Mark-Up	0.1287	0.1346	0.04605
Unit Cost	0.9691	0.9730	0.00412
Average Fixed Cost	0.1139	0.1201	0.05428
Length of Production Run	1.9201	1.8245	-0.04978
Scale Elasticity	0.8948	0.8901	-0.00523
Kap / Lab Ratio	4.9251	5.0575	0.02687
Labour Productivity	3.6387	3.6488	0.00278
Total Factor Productivity	8.2709	8.2320	-0.00471
Exports	173.5444 78.8933	1705.1291 775.1516	8.82532
Imports	1552.0512 705.5623	1714.5293 779.4248	0.10469
Final Consumption	495.9018 225.4370	474.0944 215.5233	-0.04398
Domestic Intermediate Use	1339.3475 608.8672	1576.2248 716.5518	0.17686
Intra-Ind. Trade Index	0.2011	0.9973	3.95796

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.6
Export subsidy - export subsidy experiment for industry 6 - KNITTING MILLS with an import tariff of 33.24 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	416.2433 111.0953	490.5176 130.9192	0.17844
Consumer Price	1.1100	1.1132	0.00285
Value-Added	204.2305 54.5091	242.1634 64.6334	0.18574
Employment	172.6344 46.0761	204.1424 54.4856	0.18251
Capital Requirements	461.0133	550.3142	0.19371
No. of Firms	1786.4266 476.7971	2153.7112 574.8254	0.20560
Mark-Up	0.1364	0.1394	0.02224
Unit Cost	0.9724	0.9726	0.00018
Average Fixed Cost	0.1267	0.1296	0.02323
Length of Production Run	0.1165	0.1139	-0.02253
Scale Elasticity	0.8847	0.8824	-0.00265
Kap / Lab Ratio	2.6705	2.6957	0.00947
Labour Productivity	2.8605	2.8610	0.00019
Total Factor Productivity	5.5045	5.4937	-0.00197
Exports	8.8804 2.3702	95.0138 25.3592	9.69922
Imports	325.1761 86.7895	328.4523 87.6639	0.01007
Final Consumption	268.0417 71.5403	264.0499 70.4749	-0.01489
Domestic Intermediate Use	140.1652 37.4101	140.7297 37.5607	0.00403
Intra-Ind. Trade Index	0.0532	0.4487	7.44021

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.7
Export subsidy - export subsidy experiment for industry 7 - CLOTHING with an import tariff of 32.44 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	2174.0773 469.8179	3792.9086 819.6475	0.74461
Consumer Price	1.0418	1.0441	0.00222
Value-Added	954.7316 206.3175	1664.1981 359.6331	0.74311
Employment	947.4243 204.7384	1636.5508 353.6584	0.72737
Capital Requirements	818.9478	1404.6953	0.71524
No. of Firms	1536.6269 332.0649	2635.6901 569.5725	0.71524
Mark-Up	0.2129	0.2101	-0.01274
Unit Cost	0.8587	0.8625	0.00447
Average Fixed Cost	0.1799	0.1784	-0.00852
Length of Production Run	0.7074	0.7195	0.01712
Scale Elasticity	0.8268	0.8286	0.00224
Kap / Lab Ratio	0.8644	0.8583	-0.00702
Labour Productivity	3.4767	3.4987	0.00634
Total Factor Productivity	8.4904	8.5082	0.00209
Exports	68.6147 14.8276	1693.5510 365.9763	23.68204
Imports	694.2296 150.0230	722.9183 156.2226	0.04132
Final Consumption	1916.2273 414.0967	1904.4945 411.5610	-0.00612
Domestic Intermediate Use	191.9675 41.4842	265.9046 57.4620	0.38515
Intra-Ind. Trade Index	0.1799	0.5983	2.32603

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.8
Export subsidy - export subsidy experiment for industry 8 - WOOD with an import tariff of 6.27 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	5276.5160 776.1753	17369.2440 2555.0156	2.29180
Consumer Price	1.0342	1.0739	0.03841
Value-Added	1904.6844 280.1790	6440.5965 947.4116	2.38145
Employment	1335.1390 196.3989	4294.7763 631.7615	2.21672
Capital Requirements	6332.5533	20574.0510	2.24894
No. of Firms	814.7452 119.8490	2647.0537 389.3816	2.24893
Mark-Up	0.2566	0.2488	-0.03049
Unit Cost	0.7807	0.8158	0.04492
Average Fixed Cost	0.1928	0.1951	0.01209
Length of Production Run	3.2381	3.2809	0.01319
Scale Elasticity	0.8019	0.8070	0.00626
Kap / Lab Ratio	4.7430	4.7905	0.01001
Labour Productivity	5.4782	5.6278	0.02731
Total Factor Productivity	6.4294	6.4497	0.00317
Exports	2185.2450 321.4495	13348.1836 1963.5176	5.10832
Imports	402.6484 59.2296	633.8896 93.2451	0.57430
Final Consumption	217.8892 32.0515	204.2947 30.0517	-0.06239
Domestic Intermediate Use	2831.1037 416.4553	4061.8558 597.4988	0.43473
Intra-Ind. Trade Index	0.3112	0.0907	-0.70862

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.9
Export subsidy - export subsidy experiment for industry 9 - FURNITURE AND FIXTURES with an import tariff of 15.81 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	1164.6704 614.7129	1844.5608 973.5591	0.58376
Consumer Price	1.1860	1.1901	0.00351
Value-Added	563.2105 297.2625	896.2406 473.0356	0.59131
Employment	515.0652 271.8513	815.4782 430.4092	0.58325
Capital Requirements	1043.8085	1662.1291	0.59237
No. of Firms	1628.4961 859.5200	2595.7084 1370.0146	0.59393
Mark-Up	0.1891	0.1903	0.00643
Unit Cost	0.9024	0.9047	0.00249
Average Fixed Cost	0.1624	0.1639	0.00910
Length of Production Run	0.3576	0.3553	-0.00638
Scale Elasticity	0.8475	0.8466	-0.00101
Kap / Lab Ratio	2.0266	2.0382	0.00576
Labour Productivity	2.8963	2.9028	0.00222
Total Factor Productivity	10.6048	10.5960	-0.00082
Exports	39.8106 21.0120	764.7131 403.6155	18.20876
Imports	348.7746 184.0832	360.9449 190.5067	0.03489
Final Consumption	965.5356 509.6096	954.2458 503.6509	-0.01169
Domestic Intermediate Use	162.0349 85.5220	180.1654 95.0913	0.11189
Intra-Ind. Trade Index	0.2049	0.6413	2.12984

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.10
Export subsidy - export subsidy experiment for industry 10 - PAPER AND ALLIED PRODUCTS with an import tariff of 10.05 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	5963.9675 1782.6299	20399.5263 6097.4180	2.42046
Consumer Price	1.1689	1.2150	0.03947
Value-Added	2644.8998 790.5605	9414.0902 2813.8713	2.55934
Employment	1640.2393 490.2673	5444.1541 1627.2576	2.31912
Capital Requirements	11937.1586	42235.9471	2.53819
No. of Firms	438.8499 131.1722	1547.0954 462.4268	2.52534
Mark-Up	0.1558	0.1566	0.00570
Unit Cost	0.9306	0.9665	0.03867
Average Fixed Cost	0.1360	0.1421	0.04495
Length of Production Run	6.7950	6.5928	-0.02975
Scale Elasticity	0.8725	0.8718	-0.00077
Kap / Lab Ratio	7.2777	7.7580	0.06600
Labour Productivity	4.0113	4.1604	0.03718
Total Factor Productivity	6.8556	6.8330	-0.00329
Exports	2764.8852 826.4241	17238.2436 5152.5078	5.23470
Imports	724.8558 216.6594	1080.0763 322.8347	0.49006
Final Consumption	431.7872 129.0612	386.5226 115.5316	-0.10483
Domestic Intermediate Use	2961.4145 885.1667	4593.5996 1373.0269	0.55115
Intra-Ind. Trade Index	0.4154	0.1179	-0.71614

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.11
Export subsidy - export subsidy experiment for industry 11 - PRINTING AND PUBLISHING with an import tariff of 5.56 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	3407.5770 1668.0088	6116.2659 2993.9121	0.79490
Consumer Price	0.9739	0.9850	0.01136
Value-Added	1680.1993 822.4575	3052.5056 1494.2014	0.81675
Employment	1443.5547 706.6199	2579.9921 1262.9060	0.78725
Capital Requirements	3376.6068	6098.5990	0.80613
No. of Firms	1287.9029 630.4282	2326.1231 1138.6372	0.80613
Mark-Up	0.2602	0.2612	0.00404
Unit Cost	0.7680	0.7760	0.01052
Average Fixed Cost	0.1936	0.1964	0.01460
Length of Production Run	1.3229	1.3147	-0.00622
Scale Elasticity	0.7987	0.7980	-0.00081
Kap / Lab Ratio	2.3391	2.3638	0.01057
Labour Productivity	3.0384	3.0607	0.00734
Total Factor Productivity	5.4869	5.4807	-0.00113
Exports	139.0864 68.0828	2678.2694 1311.0127	18.25615
Imports	402.8952 197.2172	449.6255 220.0917	0.11599
Final Consumption	1023.7717 501.1362	1001.9742 490.4663	-0.02129
Domestic Intermediate Use	2240.0903 1096.5242	2377.9827 1164.0225	0.06156
Intra-Ind. Trade Index	0.5133	0.2875	-0.43986

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.12
Export subsidy - export subsidy experiment for industry 12 - PRIMARY METALS with an import tariff of 5.57 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	8090.9181 5188.7031	95343.5660 61143.8281	10.78402
Consumer Price	1.5967	1.7442	0.09235
Value-Added	1929.3549 1237.2952	19275.3483 12361.2773	8.99057
Employment	1628.3703 1044.2737	14931.7697 9575.7422	8.16976
Capital Requirements	9666.1717	71151.9891	6.36092
No. of Firms	118.2894 75.8590	870.7198 558.3923	6.36093
Mark-Up	0.1884	0.1126	-0.40225
Unit Cost	0.8603	1.0037	0.16674
Average Fixed Cost	0.1537	0.1040	-0.32368
Length of Production Run	34.1997	54.7499	0.60089
Scale Elasticity	0.8484	0.9061	0.06806
Kap / Lab Ratio	5.9361	4.7651	-0.19726
Labour Productivity	5.8338	7.2480	0.24243
Total Factor Productivity	6.7907	7.3889	0.08809
Exports	2294.3769 1471.3838	86402.4889 55409.9141	36.65834
Imports	1260.6824 808.4756	4682.1362 3002.6538	2.71397
Final Consumption	3.8557 2.4727	1.0153 0.6511	-0.73668
Domestic Intermediate Use	5842.7567 3746.9597	17970.9899 11524.7930	2.07577
Intra-Ind. Trade Index	0.7092	0.1028	-0.85504

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.13
Export subsidy - export subsidy experiment for industry 13- METAL FABRICATING with an import tariff of 8.70 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	6753.7112 4075.1892	26792.4874 16166.5859	2.96708
Consumer Price	1.0821	1.1259	0.04044
Value-Added	2242.3322 1353.0232	8905.5895 5373.6289	2.97157
Employment	2423.6437 1462.4265	8948.0274 5399.2383	2.69197
Capital Requirements	7384.0442	27104.9690	2.67075
No. of Firms	3038.2698 1833.2920	10723.5574 6470.5937	2.52949
Mark-Up	0.1930	0.1715	-0.11133
Unit Cost	0.8514	0.9020	0.05953
Average Fixed Cost	0.1582	0.1483	-0.06241
Length of Production Run	1.1114	1.2492	0.12398
Scale Elasticity	0.8433	0.8588	0.01837
Kap / Lab Ratio	3.0467	3.0292	-0.00575
Labour Productivity	3.4766	3.6954	0.06293
Total Factor Productivity	7.0012	7.0903	0.01272
Exports	719.6038 434.2087	20177.0489 12174.8281	27.03909
Imports	2185.7996 1318.9114	2902.1136 1751.1353	0.32771
Final Consumption	1081.1364 652.3577	848.7095 512.1111	-0.21498
Domestic Intermediate Use	4964.1052 2995.3411	6851.1030 4133.9531	0.38013
Intra-Ind. Trade Index	0.4954	0.2515	-0.49230

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.14
Export subsidy - export subsidy experiment for industry 14 - MACHINERY with an import tariff of 5.02 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	2678.4349 1773.9272	27280.9893 18068.1953	9.18542
Consumer Price	1.0861	1.1385	0.04829
Value-Added	1076.6676 713.0769	11026.0654 7302.5625	9.24092
Employment	1020.1497 675.6450	9368.9115 6205.0273	8.18386
Capital Requirements	2645.6770	23906.5729	8.03609
No. of Firms	988.9528 654.9834	8253.6624 5466.3984	7.34586
Mark-Up	0.1703	0.1413	-0.17055
Unit Cost	0.8949	0.9620	0.07497
Average Fixed Cost	0.1460	0.1291	-0.11534
Length of Production Run	1.3542	1.6527	0.22042
Scale Elasticity	0.8598	0.8817	0.02546
Kap / Lab Ratio	2.5934	2.5517	-0.01609
Labour Productivity	3.2545	3.5322	0.08533
Total Factor Productivity	9.4004	9.5780	0.01889
Exports	696.3384 461.1848	27097.5763 17946.7227	37.91438
Imports	4695.4700 3109.8096	7325.1836 4851.4687	0.56005
Final Consumption	936.5277 620.2622	521.2891 345.2495	-0.44338
Domestic Intermediate Use	1077.0273 713.3152	2078.0911 1376.3196	0.92947
Intra-Ind. Trade Index	0.2583	0.4256	0.64773

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.15
Export subsidy - export subsidy experiment for industry 15 - TRANSPORTATION EQUIPMENT with an import tariff of 5.97 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	23867.5728 19122.6992	513893.8709 411731.750	20.53104
Consumer Price	1.0486	1.1781	0.12356
Value-Added	4745.3382 3801.9648	62687.3410 50225.0937	12.21031
Employment	2978.4380 2386.3245	22826.2109 18288.3594	6.66382
Capital Requirements	28001.2079	202146.3476	6.21920
No. of Firms	453.7257 363.5249	3275.5374 2624.3604	6.21920
Mark-Up	0.2640	0.1311	-0.50331
Unit Cost	0.7650	0.9605	0.25557
Average Fixed Cost	0.1987	0.1223	-0.38447
Length of Production Run	26.3018	78.4442	1.98247
Scale Elasticity	0.7938	0.8871	0.11744
Kap / Lab Ratio	9.4013	8.8559	-0.05802
Labour Productivity	22.1628	56.4795	1.54839
Total Factor Productivity	11.1492	14.0276	0.25817
Exports	15645.9895 12535.5664	504646.2807 404322.562	31.25403
Imports	9955.5703 7976.4023	178572.6687 143072.375	16.93695
Final Consumption	5022.2397 4023.8184	1873.7331 1501.2349	-0.62691
Domestic Intermediate Use	2664.7578 2135.0039	47524.0279 38076.2500	16.83427
Intra-Ind. Trade Index	0.7777	0.5227	-0.32787

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.16

Export subsidy - export subsidy experiment for industry 16 - ELECTRICAL PRODUCTS with an import tariff of 10.38 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	4043.6264 2710.8469	8901.6433 5967.6602	1.20140
Consumer Price	1.1418	1.1614	0.01717
Value-Added	1797.3488 1204.9426	4032.0698 2703.0994	1.24334
Employment	1626.4676 1090.3838	3547.0875 2377.9673	1.18085
Capital Requirements	5001.7634	11158.4405	1.23090
No. of Firms	2325.7940 1559.2122	5181.0710 3473.3899	1.22766
Mark-Up	0.1704	0.1720	0.00927
Unit Cost	0.9011	0.9153	0.01580
Average Fixed Cost	0.1471	0.1509	0.02571
Length of Production Run	0.8693	0.8591	-0.01179
Scale Elasticity	0.8597	0.8585	-0.00137
Kap / Lab Ratio	3.0752	3.1458	0.02295
Labour Productivity	3.0130	3.0553	0.01403
Total Factor Productivity	8.8182	8.8052	-0.00147
Exports	437.0124 292.9729	5395.7154 3617.2876	11.34682
Imports	2617.9678 1755.0854	2973.6394 1993.5278	0.13586
Final Consumption	1792.0607 1201.3975	1634.6646 1095.8792	-0.08783
Domestic Intermediate Use	1837.2129 1231.6675	2237.4003 1499.9531	0.21782
Intra-Ind. Trade Index	0.2861	0.7106	1.48377

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.17
Export subsidy - export subsidy experiment for industry 17 - NON-METALLIC MINERAL PRODUCTION with an import tariff of 7.57 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	3532.7637 1684.7749	16916.9944 8067.7109	3.78860
Consumer Price	0.9866	1.0109	0.02460
Value-Added	1352.9456 645.2197	6590.6931 3143.1013	3.87136
Employment	841.5868 401.3525	3941.5724 1879.7358	3.68350
Capital Requirements	5802.1720	27661.3447	3.76741
No. of Firms	410.8324 195.9260	1958.6074 934.0598	3.76741
Mark-Up	0.3266	0.3199	-0.02042
Unit Cost	0.6964	0.7172	0.02978
Average Fixed Cost	0.2201	0.2219	0.00808
Length of Production Run	4.2995	4.3186	0.00444
Scale Elasticity	0.7598	0.7637	0.00509
Kap / Lab Ratio	6.8943	7.0178	0.01792
Labour Productivity	5.3223	5.4680	0.02737
Total Factor Productivity	7.1400	7.1564	0.00229
Exports	508.0084 242.2692	11691.2323 5575.5469	22.01384
Imports	466.0102 222.2402	605.9370 288.9712	0.30027
Final Consumption	245.6371 117.1443	234.0790 111.6323	-0.04705
Domestic Intermediate Use	2737.2681 1305.4031	4332.3412 2066.0935	0.58272
Intra-Ind. Trade Index	0.9569	0.0985	-0.89701

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.18
Export subsidy - export subsidy experiment for industry 18 - PETROLEUM AND COAL with an import tariff of 2.78 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	6217.8022 1866.5840	7614.0198 2285.7285	0.22455
Consumer Price	1.6242	1.6323	0.00499
Value-Added	-29.8863 -8.9719	-0.0233 -0.0070	-0.99922
Employment	318.9042 95.7350	393.1431 118.0215	0.23279
Capital Requirements	6178.1595	7938.5984	0.28495
No. of Firms	81.2425 24.3890	111.1497 33.3671	0.36812
Mark-Up	-0.0871	-0.0829	-0.04767
Unit Cost	1.1572	1.1577	0.00044
Average Fixed Cost	0.0469	0.0524	0.11736
Length of Production Run	38.2669	34.2512	-0.10494
Scale Elasticity	0.9611	0.9567	-0.00453
Kap / Lab Ratio	19.3731	20.1926	0.04230
Labour Productivity	20.8842	20.9078	0.00113
Total Factor Productivity	3.3171	3.3024	-0.00445
Exports	325.0272 97.5732	1827.7170 548.6804	4.62328
Imports	187.3760 56.2503	191.5148 57.4927	0.02209
Final Consumption	2646.0746 794.3516	2622.8143 787.3687	-0.00879
Domestic Intermediate Use	3264.0475 979.8669	3269.6208 981.5400	0.00171
Intra-Ind. Trade Index	0.7314	0.1897	-0.74063

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.19
Export subsidy - export subsidy experiment for industry 19 - CHEMICAL PRODUCTS with an import tariff of 6.23 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	4737.7894 2821.3535	16307.0007 9710.8164	2.44190
Consumer Price	1.1152	1.1386	0.02097
Value-Added	1660.2752 988.6938	5829.4726 3471.4507	2.51114
Employment	1058.4889 630.3301	3563.9978 2122.3606	2.36706
Capital Requirements	7821.9587	27289.2214	2.48880
No. of Firms	575.0557 342.4456	1999.3745 1190.6274	2.47684
Mark-Up	0.1750	0.1745	-0.00282
Unit Cost	0.8926	0.9117	0.02140
Average Fixed Cost	0.1434	0.1460	0.01819
Length of Production Run	4.1194	4.0780	-0.01005
Scale Elasticity	0.8616	0.8620	0.00044
Kap / Lab Ratio	7.3897	7.6569	0.03615
Labour Productivity	5.0369	5.1700	0.02642
Total Factor Productivity	7.7465	7.7356	-0.00140
Exports	541.0567 322.1992	11267.7527 6709.9453	19.82544
Imports	1739.6450 1035.9585	2590.6097 1542.7080	0.48916
Final Consumption	1061.6471 632.2107	966.6559 575.6436	-0.08948
Domestic Intermediate Use	3160.2862 1881.9502	4818.1012 2869.1792	0.52458
Intra-Ind. Trade Index	0.4745	0.3739	-0.21202

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.1.20
Export subsidy - export subsidy experiment for industry 20 - MISC.MANUFACTURING with an import tariff of 9.08 % and an export subsidy of 25.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	1995.1951 1365.5115	20882.3418 14291.8711	9.46631
Consumer Price	1.1055	1.1492	0.03955
Value-Added	780.5837 534.2314	8168.4745 5590.5039	9.46457
Employment	786.3784 538.1973	7551.8118 5168.4570	8.60328
Capital Requirements	1591.0457	14518.6596	8.12523
No. of Firms	1489.3786 1019.3306	12958.1130 8868.5312	7.70035
Mark-Up	0.1396	0.1128	-0.19219
Unit Cost	0.8871	0.9444	0.06462
Average Fixed Cost	0.1483	0.1319	-0.11032
Length of Production Run	0.6698	0.8058	0.20298
Scale Elasticity	0.8568	0.8774	0.02410
Kap / Lab Ratio	2.0233	1.9225	-0.04978
Labour Productivity	3.2191	3.4219	0.06301
Total Factor Productivity	11.1488	11.3588	0.01883
Exports	310.4587 212.4780	19720.9300 13497.0039	62.52188
Imports	1558.9661 1066.9563	2817.3777 1928.2131	0.80721
Final Consumption	933.9750 639.2124	634.2905 434.1084	-0.32087
Domestic Intermediate Use	754.1371 516.1313	1483.6794 1015.4299	0.96739
Intra-Ind. Trade Index	0.3321	0.2500	-0.24729

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.1
Import substitution - import substitution policy for industry 1 - FOOD AND BEVERAGE with an import tariff of 0.1426 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	16775.7789 6668.3711	15993.5782 6357.4453	-0.04663
Consumer Price	1.1651	1.2065	0.03551
Value-Added	4205.8598 1671.8291	4475.6433 1779.0681	0.06414
Employment	2705.0275 1075.2483	2732.5125 1086.1736	0.01016
Capital Requirements	21237.8727	23400.7044	0.10184
No. of Firms	1775.5443 705.7788	1956.3629 777.6541	0.10184
Mark-Up	0.2173	0.2495	0.14792
Unit Cost	0.8296	0.8369	0.00886
Average Fixed Cost	0.1847	0.2133	0.15525
Length of Production Run	4.7241	4.0876	-0.13474
Scale Elasticity	0.8179	0.7969	-0.02574
Kap / Lab Ratio	7.8513	8.5638	0.09076
Labour Productivity	9.3755	9.2794	-0.01025
Total Factor Productivity	8.7406	8.5761	-0.01882
Exports	1512.9224 601.3865	1243.6963 494.3691	-0.17795
Imports	1641.0919 652.3340	1384.8586 550.4812	-0.15614
Final Consumption	9681.8926 3848.5522	9518.2540 3783.5059	-0.01690
Domestic Intermediate Use	5595.7784 2224.3218	5286.0328 2101.1980	-0.05535
Intra-Ind. Trade Index	0.9594	0.9463	-0.01362

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.2
Import substitution - import substitution policy for industry 2 - TOBACCO with an import tariff of 0.3069 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	841.8869 465.0581	767.2727 423.8413	-0.08863
Consumer Price	2.1959	2.3441	0.06750
Value-Added	90.8469 50.1838	124.0621 68.5319	0.36562
Employment	173.3613 95.7648	174.3643 96.3188	0.00579
Capital Requirements	1107.8201	1280.9647	0.15629
No. of Firms	56.7507 31.3491	65.6204 36.2487	0.15629
Mark-Up	0.2582	0.3208	0.24235
Unit Cost	0.8164	0.8302	0.01692
Average Fixed Cost	0.2053	0.2605	0.26871
Length of Production Run	7.4174	5.8463	-0.21182
Scale Elasticity	0.7991	0.7612	-0.04739
Kap / Lab Ratio	6.3902	7.3465	0.14964
Labour Productivity	7.4029	7.2792	-0.01671
Total Factor Productivity	7.9207	7.7003	-0.02783
Exports	58.5980 32.3695	41.8617 23.1244	-0.28561
Imports	22.7014 12.5403	16.2781 8.9920	-0.28295
Final Consumption	622.8484 344.0613	588.3429 325.0005	-0.05540
Domestic Intermediate Use	161.9951 89.4861	140.7553 77.7532	-0.13111
Intra-Ind. Trade Index	0.5585	0.5600	0.00269

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.3
Import substitution - import substitution policy for industry 3 - RUBBER AND PLASTIC with an import tariff of 0.0987 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	2343.0204	2245.1790	-0.04176
	1498.5957	1436.0164	
Consumer Price	1.0820	1.1065	0.02270
Value-Added	885.7401	899.1024	0.01509
	566.5193	575.0659	
Employment	706.2784	696.4872	-0.01386
	451.7356	445.4731	
Capital Requirements	2448.2814	2654.0956	0.08406
No. of Firms	313.8995	340.2873	0.08406
	200.7701	217.6478	
Mark-Up	0.2147	0.2415	0.12495
Unit Cost	0.8270	0.8275	0.00060
Average Fixed Cost	0.1694	0.1915	0.13070
Length of Production Run	3.7321	3.2989	-0.11607
Scale Elasticity	0.8300	0.8120	-0.02163
Kap / Lab Ratio	3.4665	3.8107	0.09930
Labour Productivity	4.1933	4.1844	-0.00212
Total Factor Productivity	8.9304	8.7594	-0.01916
Exports	348.7674	266.8903	-0.23476
	223.0717	170.7030	
Imports	1071.2525	982.4245	-0.08292
	685.1729	628.3586	
Final Consumption	472.5799	503.4981	0.06542
	302.2620	322.0374	
Domestic Intermediate Use	1523.2422	1481.8890	-0.02715
	974.2656	947.8162	
Intra-Ind. Trade Index	0.4912	0.4273	-0.13020

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.4
Import substitution - import substitution policy for industry 4 - LEATHER with an import tariff of 0.1657 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	455.4213 240.1436	481.4634 253.8757	0.05718
Consumer Price	1.1225	1.1658	0.03859
Value-Added	223.0278 117.6026	253.6790 133.7650	0.13743
Employment	193.5392 102.0532	215.1286 113.4373	0.11155
Capital Requirements	444.9769	544.7278	0.22417
No. of Firms	1219.7109 643.1533	1618.3347 853.3477	0.32682
Mark-Up	0.1456	0.1797	0.23387
Unit Cost	0.9596	0.9679	0.00861
Average Fixed Cost	0.1328	0.1667	0.25535
Length of Production Run	0.1867	0.1488	-0.20322
Scale Elasticity	0.8785	0.8531	-0.02887
Kap / Lab Ratio	2.2992	2.5321	0.10132
Labour Productivity	2.8532	2.8302	-0.00809
Total Factor Productivity	8.8088	8.6213	-0.02129
Exports	25.1177 13.2446	18.6059 9.8109	-0.25925
Imports	451.2116 237.9239	380.8376 200.8156	-0.15597
Final Consumption	296.3051 156.2417	331.3652 174.7289	0.11832
Domestic Intermediate Use	136.2688 71.8545	133.8029 70.5542	-0.01810
Intra-Ind. Trade Index	0.1055	0.0932	-0.11667

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.5
Import substitution - import substitution policy for industry 5 - TEXTILES with an import tariff of 0.1714 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	1993.9185 906.4353	1908.6117 867.6548	-0.04278
Consumer Price	1.1838	1.2330	0.04163
Value-Added	862.5293 392.1057	894.7274 406.7429	0.03733
Employment	610.4017 277.4885	609.4693 277.0647	-0.00153
Capital Requirements	3006.3032	3320.2865	0.10444
No. of Firms	519.2180 236.0365	634.4394 288.4160	0.22191
Mark-Up	0.1287	0.1593	0.23805
Unit Cost	0.9691	0.9827	0.01411
Average Fixed Cost	0.1139	0.1454	0.27574
Length of Production Run	1.9201	1.5042	-0.21662
Scale Elasticity	0.8948	0.8711	-0.02643
Kap / Lab Ratio	4.9251	5.4478	0.10613
Labour Productivity	3.6387	3.5796	-0.01624
Total Factor Productivity	8.2709	8.0788	-0.02323
Exports	173.5444 78.8933	129.5094 58.8750	-0.25374
Imports	1552.0512 705.5623	1378.6443 626.7317	-0.11173
Final Consumption	495.9018 225.4370	530.2707 241.0611	0.06931
Domestic Intermediate Use	1339.3475 608.8672	1264.6647 574.9165	-0.05576
Intra-Ind. Trade Index	0.2011	0.1717	-0.14614

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.6
Import substitution - import substitution policy for industry 6 - KNITTING MILLS with an import tariff of 0.3324 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	416.2433 111.0953	452.2910 120.7165	0.08660
Consumer Price	1.1100	1.1773	0.06058
Value-Added	204.2305 54.5091	251.7229 67.1848	0.23254
Employment	172.6344 46.0761	202.9497 54.1673	0.17560
Capital Requirements	461.0133	644.7638	0.39858
No. of Firms	1786.4266 476.7971	2936.1502 783.6584	0.64359
Mark-Up	0.1364	0.2032	0.48989
Unit Cost	0.9724	0.9741	0.00169
Average Fixed Cost	0.1267	0.1917	0.51263
Length of Production Run	0.1165	0.0770	-0.33888
Scale Elasticity	0.8847	0.8356	-0.05553
Kap / Lab Ratio	2.6705	3.1770	0.18967
Labour Productivity	2.8605	2.8558	-0.00164
Total Factor Productivity	5.5045	5.2852	-0.03983
Exports	8.8804 2.3702	5.7769 1.5419	-0.34948
Imports	325.1761 86.7895	239.9102 64.0320	-0.26221
Final Consumption	268.0417 71.5403	315.4779 84.2010	0.17697
Domestic Intermediate Use	140.1652 37.4101	131.8839 35.1998	-0.05908
Intra-Ind. Trade Index	0.0532	0.0470	-0.11550

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.7
Import substitution - import substitution policy for industry 7 - CLOTHING with an import tariff of 0.3244 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	2174.0773 469.8179	2320.2624 501.4087	0.06724
Consumer Price	1.0418	1.1070	0.06261
Value-Added	954.7316 206.3175	1162.1421 251.1389	0.21724
Employment	947.4243 204.7384	1127.3037 243.6103	0.18986
Capital Requirements	818.9478	1163.6453	0.42090
No. of Firms	1536.6269 332.0649	2183.3976 471.8320	0.42090
Mark-Up	0.2129	0.2814	0.32194
Unit Cost	0.8587	0.8636	0.00578
Average Fixed Cost	0.1799	0.2400	0.33386
Length of Production Run	0.7074	0.5313	-0.24890
Scale Elasticity	0.8268	0.7825	-0.05349
Kap / Lab Ratio	0.8644	1.0322	0.19417
Labour Productivity	3.4767	3.4649	-0.00338
Total Factor Productivity	8.4904	8.1290	-0.04257
Exports	68.6147 14.8276	36.8795 7.9697	-0.46251
Imports	694.2296 150.0230	401.6138 86.7887	-0.42150
Final Consumption	1916.2273 414.0967	2099.4768 453.6968	0.09563
Domestic Intermediate Use	191.9675 41.4842	187.4611 40.5103	-0.02348
Intra-Ind. Trade Index	0.1799	0.1682	-0.06494

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.8
Import substitution - import substitution policy for industry 8 - WOOD with an import tariff of 0.0627 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	5276.5160 776.1753	4972.1189 731.3987	-0.05769
Consumer Price	1.0342	1.0501	0.01534
Value-Added	1904.6844 280.1790	1864.9260 274.3306	-0.02087
Employment	1335.1390 196.3989	1286.8212 189.2914	-0.03619
Capital Requirements	6332.5533	6398.6019	0.01043
No. of Firms	814.7452 119.8490	823.2430 121.0990	0.01043
Mark-Up	0.2566	0.2739	0.06753
Unit Cost	0.7807	0.7819	0.00153
Average Fixed Cost	0.1928	0.2066	0.07148
Length of Production Run	3.2381	3.0198	-0.06742
Scale Elasticity	0.8019	0.7910	-0.01364
Kap / Lab Ratio	4.7430	4.9724	0.04837
Labour Productivity	5.4782	5.4579	-0.00370
Total Factor Productivity	6.4294	6.3527	-0.01193
Exports	2185.2450 321.4495	1991.7541 292.9868	-0.08854
Imports	402.6484 59.2296	382.9476 56.3316	-0.04893
Final Consumption	217.8892 32.0515	217.5742 32.0052	-0.00145
Domestic Intermediate Use	2831.1037 416.4553	2754.9396 405.2515	-0.02690
Intra-Ind. Trade Index	0.3112	0.3225	0.03646

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.9
Import substitution - import substitution policy for industry 9 - FURNITURE AND FIXTURES with an import tariff of 0.1581 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	1164.6704 614.7129	1196.3419 631.4292	0.02719
Consumer Price	1.1860	1.2258	0.03361
Value-Added	563.2105 297.2625	620.4235 327.4595	0.10158
Employment	515.0652 271.8513	553.9341 292.3662	0.07546
Capital Requirements	1043.8085	1241.6604	0.18955
No. of Firms	1628.4961 859.5200	2024.5000 1068.5310	0.24317
Mark-Up	0.1891	0.2269	0.19989
Unit Cost	0.9024	0.9040	0.00177
Average Fixed Cost	0.1624	0.1967	0.21069
Length of Production Run	0.3576	0.2955	-0.17373
Scale Elasticity	0.8475	0.8213	-0.03083
Kap / Lab Ratio	2.0266	2.2415	0.10608
Labour Productivity	2.8963	2.8930	-0.00113
Total Factor Productivity	10.6048	10.3601	-0.02307
Exports	39.8106 21.0120	29.1900 15.4065	-0.26678
Imports	348.7746 184.0832	256.9348 135.6102	-0.26332
Final Consumption	965.5356 509.6096	1012.3743 534.3311	0.04851
Domestic Intermediate Use	162.0349 85.5220	157.6497 83.2075	-0.02706
Intra-Ind. Trade Index	0.2049	0.2040	-0.00422

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.10
Import substitution - import substitution policy for industry 10 - PAPER AND ALLIED PRODUCTS with an import tariff of 0.1005 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	5963.9675 1782.6299	5481.2355 1638.3411	-0.08094
Consumer Price	1.1689	1.1945	0.02197
Value-Added	2644.8998 790.5605	2550.8765 762.4568	-0.03555
Employment	1640.2393 490.2673	1537.0971 459.4382	-0.06288
Capital Requirements	11937.1586	11883.4576	-0.00450
No. of Firms	438.8499 131.1722	465.5351 139.1484	0.06081
Mark-Up	0.1558	0.1779	0.14236
Unit Cost	0.9306	0.9331	0.00274
Average Fixed Cost	0.1360	0.1569	0.15361
Length of Production Run	6.7950	5.8870	-0.13362
Scale Elasticity	0.8725	0.8561	-0.01882
Kap / Lab Ratio	7.2777	7.7311	0.06230
Labour Productivity	4.0113	3.9883	-0.00573
Total Factor Productivity	6.8556	6.7366	-0.01736
Exports	2764.8852 826.4241	2416.3674 722.2522	-0.12605
Imports	724.8558 216.6594	664.8674 198.7289	-0.08276
Final Consumption	431.7872 129.0612	441.1873 131.8709	0.02177
Domestic Intermediate Use	2961.4145 885.1667	2841.6383 849.3655	-0.04045
Intra-Ind. Trade Index	0.4154	0.4316	0.03885

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.11
Import substitution - import substitution policy for industry 11 - PRINTING AND PUBLISHING with an import tariff of 0.0556 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	3407.5770 1668.0088	3353.5161 1641.5459	-0.01586
Consumer Price	0.9739	0.9878	0.01431
Value-Added	1680.1993 822.4575	1697.9387 831.1409	0.01056
Employment	1443.5547 706.6199	1443.3396 706.5146	-0.00015
Capital Requirements	3376.6068	3542.9521	0.04926
No. of Firms	1287.9029 630.4282	1351.3501 661.4858	0.04926
Mark-Up	0.2602	0.2766	0.06299
Unit Cost	0.7680	0.7689	0.00129
Average Fixed Cost	0.1936	0.2064	0.06605
Length of Production Run	1.3229	1.2408	-0.06207
Scale Elasticity	0.7987	0.7884	-0.01285
Kap / Lab Ratio	2.3391	2.4547	0.04942
Labour Productivity	3.0384	3.0337	-0.00155
Total Factor Productivity	5.4869	5.4257	-0.01115
Exports	139.0864 68.0828	121.2440 59.3489	-0.12828
Imports	402.8952 197.2172	377.9749 185.0187	-0.06185
Final Consumption	1023.7717 501.1362	1024.6758 501.5786	0.00088
Domestic Intermediate Use	2240.0903 1096.5242	2205.3293 1079.5085	-0.01552
Intra-Ind. Trade Index	0.5133	0.4857	-0.05361

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.12
Import substitution - import substitution policy for industry 12 - PRIMARY METALS with an import tariff of 0.0557 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	8090.9181 5188.7031	7437.1666 4769.4531	-0.08080
Consumer Price	1.5967	1.6180	0.01334
Value-Added	1929.3549 1237.2952	1867.0120 1197.3147	-0.03231
Employment	1628.3703 1044.2737	1523.0712 976.7454	-0.06467
Capital Requirements	9666.1717	9610.2373	-0.00579
No. of Firms	118.2894 75.8590	117.6049 75.4200	-0.00579
Mark-Up	0.1884	0.2026	0.07555
Unit Cost	0.8603	0.8614	0.00134
Average Fixed Cost	0.1537	0.1661	0.08061
Length of Production Run	34.1997	31.6193	-0.07545
Scale Elasticity	0.8484	0.8383	-0.01186
Kap / Lab Ratio	5.9361	6.3098	0.06295
Labour Productivity	5.8338	5.7967	-0.00636
Total Factor Productivity	6.7907	6.6985	-0.01358
Exports	2294.3769 1471.3838	1837.5887 1178.4456	-0.19909
Imports	1260.6824 808.4756	1202.4233 771.1140	-0.04621
Final Consumption	3.8557 2.4727	4.5049 2.8890	0.16838
Domestic Intermediate Use	5842.7567 3746.9597	5658.8300 3629.0076	-0.03148
Intra-Ind. Trade Index	0.7092	0.7911	0.11538

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.13
Import substitution - import substitution policy for industry 13 - METAL FABRICATING with an import tariff of 0.0870 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	6753.7112 4075.1892	6521.6905 3935.1880	-0.03435
Consumer Price	1.0821	1.1050	0.02109
Value-Added	2242.3322 1353.0232	2293.6138 1383.9666	0.02287
Employment	2423.6437 1462.4265	2405.7102 1451.6055	-0.00740
Capital Requirements	7384.0442	7811.7273	0.05792
No. of Firms	3038.2698 1833.2920	3286.6306 1983.1528	0.08174
Mark-Up	0.1930	0.2150	0.11401
Unit Cost	0.8514	0.8535	0.00255
Average Fixed Cost	0.1582	0.1771	0.11904
Length of Production Run	1.1114	0.9922	-0.10732
Scale Elasticity	0.8433	0.8282	-0.01788
Kap / Lab Ratio	3.0467	3.2472	0.06581
Labour Productivity	3.4766	3.4591	-0.00503
Total Factor Productivity	7.0012	6.9045	-0.01382
Exports	719.6038 434.2087	556.9336 336.0537	-0.22606
Imports	2185.7996 1318.9114	1999.0534 1206.2288	-0.08544
Final Consumption	1081.1364 652.3577	1157.2248 698.2693	0.07038
Domestic Intermediate Use	4964.1052 2995.3411	4827.4726 2912.8970	-0.02752
Intra-Ind. Trade Index	0.4954	0.4358	-0.12025

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.14
Import substitution - import substitution policy for industry 14 - MACHINERY with an import tariff of 0.0502 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	2678.4349 1773.9272	2656.4120 1759.3416	-0.00822
Consumer Price	1.0861	1.1002	0.01303
Value-Added	1076.6676 713.0769	1099.1599 727.9734	0.02089
Employment	1020.1497 675.6450	1028.6562 681.2788	0.00834
Capital Requirements	2645.6770	2771.3319	0.04749
No. of Firms	988.9528 654.9834	1054.7909 698.5879	0.06657
Mark-Up	0.1703	0.1822	0.06968
Unit Cost	0.8949	0.8975	0.00286
Average Fixed Cost	0.1460	0.1570	0.07553
Length of Production Run	1.3542	1.2592	-0.07013
Scale Elasticity	0.8598	0.8511	-0.01006
Kap / Lab Ratio	2.5934	2.6941	0.03883
Labour Productivity	3.2545	3.2459	-0.00263
Total Factor Productivity	9.4004	9.3268	-0.00783
Exports	696.3384 461.1848	580.7028 384.5994	-0.16606
Imports	4695.4700 3109.8096	4467.2623 2958.6677	-0.04860
Final Consumption	936.5277 620.2622	1046.7257 693.2463	0.11767
Domestic Intermediate Use	1077.0273 713.3152	1062.3503 703.5945	-0.01363
Intra-Ind. Trade Index	0.2583	0.2301	-0.10926

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.15
Import substitution - import substitution policy for industry 15 - TRANSPORTATION EQUIPMENT with an import tariff of 0.0597 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	23867.5728 19122.6992	18746.7243 15019.8750	-0.21455
Consumer Price	1.0486	1.0680	0.01852
Value-Added	4745.3382 3801.9648	3941.0586 3157.5759	-0.16949
Employment	2978.4380 2386.3245	2459.1257 1970.2515	-0.17436
Capital Requirements	28001.2079	23414.8755	-0.16379
No. of Firms	453.7257 363.5249	379.4098 303.9829	-0.16379
Mark-Up	0.2640	0.2767	0.04778
Unit Cost	0.7650	0.7714	0.00846
Average Fixed Cost	0.1987	0.2100	0.05716
Length of Production Run	26.3018	24.7051	-0.06071
Scale Elasticity	0.7938	0.7860	-0.00986
Kap / Lab Ratio	9.4013	9.5216	0.01280
Labour Productivity	22.1628	21.5713	-0.02669
Total Factor Productivity	11.1492	11.0116	-0.01234
Exports	15645.9895 12535.5664	11119.2714 8908.7578	-0.28932
Imports	9955.5703 7976.4023	8091.0852 6482.5742	-0.18728
Final Consumption	5022.2397 4023.8184	5237.9109 4196.6133	0.04294
Domestic Intermediate Use	2664.7578 2135.0039	2218.7153 1777.6345	-0.16739
Intra-Ind. Trade Index	0.7777	0.8424	0.08311

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.16
Import substitution - import substitution policy for industry 16 - ELECTRICAL PRODUCTS with an import tariff of 0.1038 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	4043.6264 2710.8469	4039.8057 2708.2856	-0.00094
Consumer Price	1.1418	1.1709	0.02552
Value-Added	1797.3488 1204.9426	1892.0366 1268.4211	0.05268
Employment	1626.4676 1090.3838	1674.4192 1122.5305	0.02948
Capital Requirements	5001.7634	5473.6164	0.09434
No. of Firms	2325.7940 1559.2122	2674.1429 1792.7454	0.14978
Mark-Up	0.1704	0.1943	0.13990
Unit Cost	0.9011	0.9056	0.00502
Average Fixed Cost	0.1471	0.1693	0.15090
Length of Production Run	0.8693	0.7553	-0.13109
Scale Elasticity	0.8597	0.8425	-0.01997
Kap / Lab Ratio	3.0752	3.2690	0.06300
Labour Productivity	3.0130	2.9982	-0.00491
Total Factor Productivity	8.8182	8.6891	-0.01464
Exports	437.0124 292.9729	355.2081 238.1315	-0.18719
Imports	2617.9678 1755.0854	2340.6577 1569.1768	-0.10593
Final Consumption	1792.0607 1201.3975	1920.3626 1287.4109	0.07159
Domestic Intermediate Use	1837.2129 1231.6675	1791.0352 1200.7100	-0.02513
Intra-Ind. Trade Index	0.2861	0.2635	-0.07892

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.17
Import substitution - import substitution policy for industry 17 - NON-METALLIC MINERAL PRODUCTION with an import tariff of 0.0757 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	3532.7637 1684.7749	3337.2950 1591.5559	-0.05533
Consumer Price	0.9866	1.0068	0.02044
Value-Added	1352.9456 645.2197	1335.0430 636.6819	-0.01323
Employment	841.5868 401.3525	810.4101 386.4844	-0.03705
Capital Requirements	5802.1720	5890.3482	0.01520
No. of Firms	410.8324 195.9260	417.0759 198.9035	0.01520
Mark-Up	0.3266	0.3492	0.06914
Unit Cost	0.6964	0.6988	0.00337
Average Fixed Cost	0.2201	0.2365	0.07439
Length of Production Run	4.2995	4.0008	-0.06947
Scale Elasticity	0.7598	0.7471	-0.01672
Kap / Lab Ratio	6.8943	7.2684	0.05425
Labour Productivity	5.3223	5.2982	-0.00452
Total Factor Productivity	7.1400	7.0203	-0.01676
Exports	508.0084 242.2692	408.1444 194.6441	-0.19658
Imports	466.0102 222.2402	444.3188 211.8956	-0.04655
Final Consumption	245.6371 117.1443	245.1998 116.9358	-0.00178
Domestic Intermediate Use	2737.2681 1305.4031	2659.1785 1268.1621	-0.02853
Intra-Ind. Trade Index	0.9569	0.9576	0.00071

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.18
Import substitution - import substitution policy for industry 18 - PETROLEUM AND COAL with an import tariff of 0.0278 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	6217.8022 1866.5840	6175.3670 1853.8450	-0.00683
Consumer Price	1.6242	1.6333	0.00562
Value-Added	-29.8863 -8.9719	6.6956 2.0100	-1.22403
Employment	318.9042 95.7350	319.8804 96.0281	0.00306
Capital Requirements	6178.1595	6504.2647	0.05278
No. of Firms	81.2425 24.3890	92.2555 27.6951	0.13556
Mark-Up	-0.0871	-0.0820	-0.05846
Unit Cost	1.1572	1.1572	0.00004
Average Fixed Cost	0.0469	0.0536	0.14333
Length of Production Run	38.2669	33.4688	-0.12539
Scale Elasticity	0.9611	0.9557	-0.00555
Kap / Lab Ratio	19.3731	20.3334	0.04957
Labour Productivity	20.8842	20.8745	-0.00046
Total Factor Productivity	3.3171	3.2991	-0.00542
Exports	325.0272 97.5732	315.8908 94.8304	-0.02811
Imports	187.3760 56.2503	181.6612 54.5347	-0.03050
Final Consumption	2646.0746 794.3516	2633.6935 790.6348	-0.00468
Domestic Intermediate Use	3264.0475 979.8669	3244.3124 973.9424	-0.00605
Intra-Ind. Trade Index	0.7314	0.7302	-0.00156

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.19
Import substitution - import substitution policy for industry 19 - CHEMICAL PRODUCTS with an import tariff of 0.0623 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	4737.7894 2821.3535	4610.5291 2745.5701	-0.02686
Consumer Price	1.1152	1.1337	0.01654
Value-Added	1660.2752 988.6938	1680.4764 1000.7236	0.01217
Employment	1058.4889 630.3301	1045.6117 622.6616	-0.01217
Capital Requirements	7821.9587	8098.6110	0.03537
Nc. of Firms	575.0557 342.4456	610.2042 363.3765	0.06112
Mark-Up	0.1750	0.1888	0.07904
Unit Cost	0.8926	0.8968	0.00471
Average Fixed Cost	0.1434	0.1563	0.09024
Length of Production Run	4.1194	3.7779	-0.08291
Scale Elasticity	0.8616	0.8516	-0.01165
Kap / Lab Ratio	7.3897	7.7453	0.04812
Labour Productivity	5.0369	5.0086	-0.00563
Total Factor Productivity	7.7465	7.6538	-0.01196
Exports	541.0567 322.1992	456.9805 272.1318	-0.15539
Imports	1739.6450 1035.9585	1635.7955 974.1162	-0.05970
Final Consumption	1061.6471 632.2107	1091.5245 650.0027	0.02814
Domestic Intermediate Use	3160.2862 1881.9502	3090.3965 1840.3311	-0.02212
Intra-Ind. Trade Index	0.4745	0.4367	-0.07955

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.2.20
Import substitution - import substitution policy for industry 20 - MISC.MANUFACTURING with an import tariff of 0.0908 % raised by 50.00 % (individual industry statistics)

Variable	Original Tariff	Increased Tariff	Percentage Change
Industry Output	1995.1951 1365.5115	2018.0933 1381.1829	0.01148
Consumer Price	1.1055	1.1300	0.02214
Value-Added	780.5837 534.2314	830.4060 568.3298	0.06383
Employment	786.3784 538.1973	819.9854 561.1980	0.04274
Capital Requirements	1591.0457	1788.3762	0.12403
No. of Firms	1489.3786 1019.3306	1708.3119 1169.1685	0.14700
Mark-Up	0.1396	0.1609	0.15209
Unit Cost	0.8871	0.8902	0.00344
Average Fixed Cost	0.1483	0.1682	0.13413
Length of Production Run	0.6698	0.5907	-0.11815
Scale Elasticity	0.8568	0.8411	-0.01831
Kap / Lab Ratio	2.0233	2.1810	0.07796
Labour Productivity	3.2191	3.2088	-0.00319
Total Factor Productivity	11.1488	10.9867	-0.01455
Exports	310.4587 212.4780	220.9991 151.2518	-0.28815
Imports	1558.9661 1066.9563	1360.6747 931.2456	-0.12719
Final Consumption	933.9750 639.2124	1065.4247 729.1765	0.14074
Domestic Intermediate Use	754.1371 516.1313	738.8067 505.6392	-0.02033
Intra-Ind. Trade Index	0.3321	0.2794	-0.15865

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.1
Employment subsidy - subsidy experiment for industry 1 - FOOD AND BEVERAGE with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	16775.7789 6668.3711	16980.7668 6749.8516	0.01222
Consumer Price	1.1651	1.1571	-0.00686
Value-Added	4793.2376 1905.3118	4904.6470 1949.5969	0.02324
Employment	2705.0276 1075.2483	2958.1109 1175.8489	0.09356
Capital Requirements	21237.8728	22648.4677	0.06642
No. of Firms	1775.5443 705.7788	1893.4739 752.6558	0.06642
Mark-Up	0.2173	0.2259	0.03953
Unit Cost	0.8296	0.8181	-0.01382
Average Fixed Cost	0.1847	0.1892	0.02444
Length of Production Run	4.7241	4.4840	-0.05082
Scale Elasticity	0.8179	0.8122	-0.00701
Kap / Lab Ratio	7.8513	7.6564	-0.02482
Labour Productivity	6.2017	5.7404	-0.07438
Total Factor Productivity	8.7406	8.6752	-0.00749
Exports	1512.9224 601.3865	1572.5323 625.0815	0.03940
Imports	1641.0919 652.3340	1594.4210 633.7822	-0.02844
Final Consumption	9681.8926 3848.5522	9786.9418 3890.3093	0.01085
Domestic Intermediate Use	5595.7784 2224.3218	5625.9399 2236.3110	0.00539
Intra-Ind. Trade Index	0.9594	0.9931	0.03515

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.2
Employment Subsidy - subsidy experiment for industry 2 - TOBACCO with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	841.8869 465.0581	852.7561 471.0623	0.01291
Consumer Price	2.1959	2.1755	-0.00926
Value-Added	280.5695 154.9866	287.0132 158.5461	0.02297
Employment	173.3613 95.7648	189.7853 104.8374	0.09474
Capital Requirements	1107.8201	1192.1524	0.07612
No. of Firms	56.7507 31.3491	61.0708 33.7355	0.07612
Mark-Up	0.2582	0.2701	0.04612
Unit Cost	0.8164	0.8013	-0.01855
Average Fixed Cost	0.2053	0.2110	0.02769
Length of Production Run	7.4174	6.9817	-0.05874
Scale Elasticity	0.7991	0.7916	-0.00938
Kap / Lab Ratio	6.3902	6.2816	-0.01700
Labour Productivity	4.8563	4.4933	-0.07475
Total Factor Productivity	7.9207	7.8845	-0.00457
Exports	58.5980 32.3695	61.4740 33.9582	0.04908
Imports	22.7014 12.5403	21.7399 12.0091	-0.04236
Final Consumption	622.8484 344.0613	629.7959 347.8992	0.01115
Domestic Intermediate Use	161.9951 89.4861	162.5576 89.7968	0.00347
Intra-Ind. Trade Index	0.5585	0.5225	-0.06439

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.3
Employment subsidy - subsidy experiment for industry 3 - RUBBER AND PLASTIC with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	2343.0204	2469.1882	0.05385
	1498.5957	1579.2927	
Consumer Price	1.0820	1.0671	-0.01375
Value-Added	926.3810	984.5273	0.06277
	592.5132	629.7036	
Employment	706.2784	805.4437	0.14041
	451.7356	515.1616	
Capital Requirements	2448.2814	2827.5969	0.15493
No. of Firms	313.8995	362.5323	0.15493
	200.7701	231.8757	
Mark-Up	0.2147	0.2330	0.08510
Unit Cost	0.8270	0.8035	-0.02837
Average Fixed Cost	0.1694	0.1791	0.05767
Length of Production Run	3.7321	3.4055	-0.08752
Scale Elasticity	0.8300	0.8177	-0.01483
Kap / Lab Ratio	3.4665	3.5106	0.01274
Labour Productivity	3.3174	3.0656	-0.07590
Total Factor Productivity	8.9304	8.7950	-0.01516
Exports	348.7674	411.3669	0.17949
	223.0717	263.1101	
Imports	1071.2525	1046.6039	-0.02301
	685.1729	669.4077	
Final Consumption	472.5799	507.6070	0.07412
	302.2620	324.6653	
Domestic Intermediate Use	1523.2422	1546.3543	0.01517
	974.2656	989.0481	
Intra-Ind. Trade Index	0.4912	0.5643	0.14879

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.4
Employment subsidy - subsidy experiment for industry 4 - LEATHER with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	455.4213 240.1436	501.7714 264.5840	0.10177
Consumer Price	1.1225	1.1006	-0.01943
Value-Added	230.1424 121.3540	254.0212 133.9454	0.10376
Employment	193.5392 102.0532	231.9189 122.2908	0.19830
Capital Requirements	444.9769	535.0383	0.20240
No. of Firms	1219.7109 643.1533	1579.2987 832.7642	0.29481
Mark-Up	0.1456	0.1673	0.14937
Unit Cost	0.9596	0.9235	-0.03770
Average Fixed Cost	0.1328	0.1477	0.11285
Length of Production Run	0.1867	0.1589	-0.14909
Scale Elasticity	0.8785	0.8621	-0.01866
Kap / Lab Ratio	2.2992	2.3070	0.00341
Labour Productivity	2.3531	2.1636	-0.08056
Total Factor Productivity	8.8088	8.6999	-0.01237
Exports	25.1177 13.2446	29.3434 15.4728	0.16824
Imports	451.2116 237.9239	424.0830 223.6190	-0.06012
Final Consumption	296.3051 156.2417	333.0105 175.5964	0.12388
Domestic Intermediate Use	136.2388 71.8545	141.5409 74.6345	0.03869
Intra-Ind. Trade Index	0.1055	0.1294	0.22724

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.5
Employment subsidy - subsidy experiment for industry 5 - TEXTILES with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	1993.9185 906.4353	2083.0049 946.9338	0.04468
Consumer Price	1.1838	1.1649	-0.01597
Value-Added	894.0876 406.4521	938.1511 426.4834	0.04928
Employment	610.4017 277.4885	690.3531 313.8345	0.13098
Capital Requirements	3006.3032	3323.2310	0.10542
No. of Firms	519.2180 236.0365	616.1299 280.0925	0.18665
Mark-Up	0.1287	0.1454	0.13025
Unit Cost	0.9691	0.9396	-0.03037
Average Fixed Cost	0.1139	0.1261	0.10653
Length of Production Run	1.9201	1.6904	-0.11964
Scale Elasticity	0.8948	0.8817	-0.01464
Kap / Lab Ratio	4.9251	4.8138	-0.02260
Labour Productivity	3.2666	3.0173	-0.07631
Total Factor Productivity	8.2709	8.1732	-0.01182
Exports	173.5444 78.8933	194.7951 88.5538	0.12245
Imports	1552.0512 705.5623	1526.6473 694.0137	-0.01637
Final Consumption	495.9018 225.4370	535.2689 243.3332	0.07939
Domestic Intermediate Use	1339.3475 608.8672	1366.7475 621.3232	0.02046
Intra-Ind. Trade Index	0.2011	0.2263	0.12516

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.6
Employment subsidy - subsidy experiment for industry 6 - KNITTING MILLS with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	416.2433 111.0953	447.0212 119.3100	0.07394
Consumer Price	1.1100	1.0897	-0.01830
Value-Added	211.9988 56.5825	228.0067 60.8550	0.07551
Employment	172.6344 46.0761	201.5172 53.7849	0.16731
Capital Requirements	461.0133	534.2795	0.15892
No. of Firms	1786.4266 476.7971	2243.8515 598.8838	0.25606
Mark-Up	0.1364	0.1564	0.14738
Unit Cost	0.9724	0.9381	-0.03536
Average Fixed Cost	0.1267	0.1410	0.11273
Length of Production Run	0.1165	0.0996	-0.14499
Scale Elasticity	0.8847	0.8693	-0.01739
Kap / Lab Ratio	2.6705	2.6513	-0.00718
Labour Productivity	2.4111	2.2183	-0.07998
Total Factor Productivity	5.5045	5.4420	-0.01136
Exports	8.8804 2.3702	10.1641 2.7128	0.14455
Imports	325.1761 86.7895	307.7689 82.1435	-0.05353
Final Consumption	268.0417 71.5403	294.5963 78.6277	0.09907
Domestic Intermediate Use	140.1652 37.4101	143.0555 38.1815	0.02062
Intra-Ind. Trade Index	0.0532	0.0639	0.20259

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.7
Employment subsidy - subsidy experiment for industry 7 - CLOTHING with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	2174.0773 469.8179	2337.6790 505.1724	0.07525
Consumer Price	1.0418	1.0241	-0.01693
Value-Added	983.8587 212.6118	1062.0866 229.5169	0.07951
Employment	947.4243 204.7384	1118.8903 241.7922	0.18098
Capital Requirements	818.9478	1011.2531	0.23482
No. of Firms	1536.6269 332.0649	1897.4575 410.0405	0.23482
Mark-Up	0.2129	0.2331	0.09505
Unit Cost	0.8587	0.8303	-0.03306
Average Fixed Cost	0.1799	0.1908	0.06019
Length of Production Run	0.7074	0.6160	-0.12922
Scale Elasticity	0.8268	0.8132	-0.01643
Kap / Lab Ratio	0.8644	0.9038	0.04559
Labour Productivity	2.2947	2.0893	-0.08953
Total Factor Productivity	8.4904	8.3517	-0.01634
Exports	68.6147 14.8276	81.7000 17.6554	0.19071
Imports	694.2296 150.0230	610.4136 131.9104	-0.12073
Final Consumption	1916.2273 414.0967	2058.6528 444.8748	0.07433
Domestic Intermediate Use	191.9675 41.4842	199.2286 43.0533	0.03782
Intra-Ind. Trade Index	0.1799	0.2361	0.31239

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.8
Employment subsidy - subsidy experiment for industry 8 - WOOD with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	5276.5160 776.1753	5505.0726 809.7961	0.04332
Consumer Price	1.0342	1.0228	-0.01101
Value-Added	1930.3990 283.9617	2033.9632 299.1958	0.05365
Employment	1335.1390 196.3989	1506.1584 221.5559	0.12809
Capital Requirements	6332.5533	7113.6930	0.12335
No. of Firms	814.7452 119.8490	915.2465 134.6328	0.12335
Mark-Up	0.2566	0.2728	0.06314
Unit Cost	0.7807	0.7623	-0.02359
Average Fixed Cost	0.1928	0.2005	0.04000
Length of Production Run	3.2381	3.0074	-0.07125
Scale Elasticity	0.8019	0.7917	-0.01274
Kap / Lab Ratio	4.7430	4.7231	-0.00420
Labour Productivity	3.9520	3.6550	-0.07515
Total Factor Productivity	6.4294	6.3327	-0.01504
Exports	2185.2450 321.4495	2337.5580 343.8547	0.06970
Imports	402.6484 59.2296	401.8047 59.1055	-0.00210
Final Consumption	217.8892 32.0515	222.9911 32.8020	0.02341
Domestic Intermediate Use	2831.1037 416.4553	2872.7817 422.5862	0.01472
Intra-Ind. Trade Index	0.3112	0.2934	-0.05727

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.9
Employment subsidy - subsidy experiment for industry 9 - FURNITURE AND FIXTURES with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	1164.6704 614.7129	1247.6287 658.4983	0.07123
Consumer Price	1.1860	1.1627	-0.01960
Value-Added	597.6987 315.4653	640.2262 337.9114	0.07115
Employment	515.0652 271.8513	598.8629 316.0798	0.16269
Capital Requirements	1043.8085	1229.7771	0.17816
No. of Firms	1628.4961 859.5200	1998.8067 1054.9700	0.22739
Mark-Up	0.1891	0.2115	0.11872
Unit Cost	0.9024	0.8684	-0.03776
Average Fixed Cost	0.1624	0.1756	0.08136
Length of Production Run	0.3576	0.3121	-0.12723
Scale Elasticity	0.8475	0.8318	-0.01853
Kap / Lab Ratio	2.0266	2.0535	0.01331
Labour Productivity	2.2612	2.0833	-0.07867
Total Factor Productivity	10.6048	10.4677	-0.01293
Exports	39.8106 21.0120	47.9398 25.3026	0.20420
Imports	348.7746 184.0832	302.5237 159.6720	-0.13261
Final Consumption	965.5356 509.6096	1035.8167 546.7039	0.07279
Domestic Intermediate Use	162.0349 85.5220	166.2433 87.7432	0.02597
Intra-Ind. Trade Index	0.2049	0.2736	0.33518

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.10
Employment subsidy - subsidy experiment for industry 10 - PAPER AND ALLIED PRODUCTS with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	5963.9675 1782.6299	6311.9305 1886.6360	0.05834
Consumer Price	1.1689	1.1529	-0.01369
Value-Added	2807.9683 839.3015	2981.7209 891.2363	0.06188
Employment	1640.2393 490.2673	1874.9336 560.4175	0.14309
Capital Requirements	11937.1586	13128.2797	0.09978
No. of Firms	438.8499 131.1722	509.8439 152.3923	0.16177
Mark-Up	0.1558	0.1717	0.10266
Unit Cost	0.9306	0.9053	-0.02715
Average Fixed Cost	0.1360	0.1466	0.07849
Length of Production Run	6.7950	6.1901	-0.08903
Scale Elasticity	0.8725	0.8606	-0.01365
Kap / Lab Ratio	7.2777	7.0020	-0.03788
Labour Productivity	3.6360	3.3665	-0.07413
Total Factor Productivity	6.8556	6.7781	-0.01130
Exports	2764.8852 826.4241	3011.5554 900.1538	0.08922
Imports	724.8558 216.6594	716.5030 214.1628	-0.01152
Final Consumption	431.7872 129.0612	450.1158 134.5396	0.04245
Domestic Intermediate Use	2961.4145 885.1667	3022.8249 903.5222	0.02074
Intra-Ind. Trade Index	0.4154	0.3844	-0.07471

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.11
Employment subsidy - subsidy experiment for industry 11 - PRINTING AND PUBLISHING with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % 2 (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	3407.5770 1668.0088	3534.0765 1729.9304	0.03712
Consumer Price	0.9739	0.9541	-0.02029
Value-Added	1722.5632 843.1946	1786.3509 874.4187	0.03703
Employment	1443.5547 706.6199	1609.7946 787.9944	0.11516
Capital Requirements	3376.6068	3921.5597	0.16139
No. of Firms	1287.9029 630.4282	1495.7584 732.1736	0.16139
Mark-Up	0.2602	0.2897	0.11331
Unit Cost	0.7680	0.7352	-0.04269
Average Fixed Cost	0.1936	0.2069	0.06856
Length of Production Run	1.3229	1.1814	-0.10700
Scale Elasticity	0.7987	0.7804	-0.02286
Kap / Lab Ratio	2.3391	2.4361	0.04146
Labour Productivity	2.3605	2.1954	-0.06998
Total Factor Productivity	5.4869	5.3830	-0.01893
Exports	139.0864 68.0828	169.5539 82.9966	0.21905
Imports	402.8952 197.2172	378.2947 185.1753	-0.06106
Final Consumption	1023.7717 501.1362	1071.3496 524.4255	0.04647
Domestic Intermediate Use	2240.0903 1096.5242	2283.9015 1117.9697	0.01956
Intra-Ind. Trade Index	0.5133	0.6190	0.20600

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.12
Employment subsidy - subsidy experiment for industry 12 - PRIMARY METALS with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	8090.9181 5188.7031	8630.8805 5534.9805	0.06674
Consumer Price	1.5967	1.5812	-0.00974
Value-Added	2558.2964 1640.6353	2763.0239 1771.9272	0.08002
Employment	1628.3703 1044.2737	1879.3988 1205.2583	0.15416
Capital Requirements	9666.1717	10987.9661	0.13674
No. of Firms	118.2894 75.8590	134.4648 86.2323	0.13674
Mark-Up	0.1884	0.2005	0.06472
Unit Cost	0.8603	0.8432	-0.01979
Average Fixed Cost	0.1537	0.1609	0.04673
Length of Production Run	34.1997	32.0935	-0.06159
Scale Elasticity	0.8484	0.8398	-0.01018
Kap / Lab Ratio	5.9361	5.8465	-0.01509
Labour Productivity	4.9687	4.5924	-0.07575
Total Factor Productivity	6.7907	6.7061	-0.01247
Exports	2294.3769 1471.3838	2703.1579 1733.5352	0.17817
Imports	1260.6824 808.4756	1273.5803 816.7468	0.01023
Final Consumption	3.8557 2.4727	4.4490 2.8532	0.15388
Domestic Intermediate Use	5842.7567 3746.9597	5956.2697 3819.7556	0.01943
Intra-Ind. Trade Index	0.7092	0.6405	-0.09689

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.13
Employment subsidy - subsidy experiment for industry 13 - METAL FABRICATING with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % 2 (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	6753.7112 4075.1892	7139.2392 4307.8164	0.05708
Consumer Price	1.0821	1.0643	-0.01650
Value-Added	3072.1537 1853.7373	3260.8555 1967.6001	0.06142
Employment	2423.6437 1462.4265	2766.6828 1669.4163	0.14154
Capital Requirements	7384.0442	8495.1704	0.15048
No. of Firms	3038.2698 1833.2920	3599.1830 2171.7468	0.18462
Mark-Up	0.1930	0.2139	0.10805
Unit Cost	0.8514	0.8229	-0.03340
Average Fixed Cost	0.1582	0.1700	0.07453
Length of Production Run	1.1114	0.9918	-0.10766
Scale Elasticity	0.8433	0.8288	-0.01720
Kap / Lab Ratio	3.0467	3.0705	0.00783
Labour Productivity	2.7866	2.5804	-0.07398
Total Factor Productivity	7.0012	6.9159	-0.01219
Exports	719.6038 434.2087	882.7477 532.6499	0.22671
Imports	2185.7996 1318.9114	2102.9790 1268.9375	-0.03789
Final Consumption	1081.1364 652.3577	1193.5099 720.1638	0.10394
Domestic Intermediate Use	4964.1052 2995.3411	5062.0577 3054.4456	0.01973
Intra-Ind. Trade Index	0.4954	0.5913	0.19371

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.14
Employment subsidy - subsidy experiment for industry 14 - MACHINERY with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	2678.4349 1773.9272	3106.3237 2057.3181	0.15975
Consumer Price	1.0861	1.0685	-0.01617
Value-Added	1244.6664 824.3425	1450.1282 960.4197	0.16507
Employment	1020.1497 675.6450	1282.5101 849.4062	0.25718
Capital Requirements	2645.6770	3355.8809	0.26844
No. of Firms	988.9528 654.9834	1306.8328 865.5154	0.32143
Mark-Up	0.1703	0.1906	0.11898
Unit Cost	0.8949	0.8654	-0.03292
Average Fixed Cost	0.1460	0.1586	0.08670
Length of Production Run	1.3542	1.1885	-0.12235
Scale Elasticity	0.8598	0.8451	-0.01705
Kap / Lab Ratio	2.5934	2.6167	0.00896
Labour Productivity	2.6255	2.4221	-0.07749
Total Factor Productivity	9.4004	9.2858	-0.01219
Exports	696.3384 461.1848	875.2946 579.7075	0.25700
Imports	4695.4700 3109.8096	4531.8350 3001.4343	-0.03485
Final Consumption	936.5277 620.2622	1148.5398 760.6777	0.22638
Domestic Intermediate Use	1077.0273 713.3152	1108.2923 734.0220	0.02903
Intra-Ind. Trade Index	0.2583	0.3238	0.25343

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.15
Employment subsidy - subsidy experiment for industry 15 - TRANSPORTATION EQUIPMENT with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	23867.5728 19122.6992	24885.3582 19938.1484	0.04264
Consumer Price	1.0486	1.0459	-0.00252
Value-Added	5763.1671 4617.4492	6043.6044 4842.1328	0.04866
Employment	2978.4380 2386.3245	3309.3849 2651.4790	0.11111
Capital Requirements	28001.2078	30544.9451	0.09084
No. of Firms	453.7257 363.5249	494.9439 396.5491	0.09084
Mark-Up	0.2640	0.2676	0.01335
Unit Cost	0.7650	0.7609	-0.00530
Average Fixed Cost	0.1987	0.2003	0.00818
Length of Production Run	26.3018	25.1396	-0.04419
Scale Elasticity	0.7938	0.7916	-0.00278
Kap / Lab Ratio	9.4013	9.2298	-0.01824
Labour Productivity	8.0135	7.5196	-0.06162
Total Factor Productivity	11.1492	11.0239	-0.01124
Exports	15645.9895 12535.5664	16399.6121 13139.3672	0.04817
Imports	9955.5703 7976.4023	10090.9501 8084.8672	0.01360
Final Consumption	5022.2397 4023.8184	5139.5600 4117.8125	0.02336
Domestic Intermediate Use	2664.7578 2135.0039	2742.9284 2197.6340	0.02933
Intra-Ind. Trade Index	0.7777	0.7619	-0.02042

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.16
Employment subsidy - subsidy experiment for industry 16 - ELECTRICAL PRODUCTS with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	4043.6264 2710.8469	4363.3409 2925.1836	0.07907
Consumer Price	1.1418	1.1208	-0.01836
Value-Added	2066.6396 1385.4751	2231.8595 1496.2385	0.07995
Employment	1626.4676 1090.3838	1896.5867 1271.4717	0.16608
Capital Requirements	5001.7634	5803.2733	0.16025
No. of Firms	2325.7940 1559.2122	2870.8708 1924.6316	0.23436
Mark-Up	0.1704	0.1926	0.13008
Unit Cost	0.9011	0.8681	-0.03661
Average Fixed Cost	0.1471	0.1609	0.09350
Length of Production Run	0.8693	0.7599	-0.12581
Scale Elasticity	0.8597	0.8437	-0.01860
Kap / Lab Ratio	3.0752	3.0599	-0.00500
Labour Productivity	2.4861	2.3006	-0.07462
Total Factor Productivity	8.8182	8.7125	-0.01199
Exports	437.0124 292.9729	508.9598 341.2065	0.16464
Imports	2617.9678 1755.0854	2474.6211 1658.9858	-0.05475
Final Consumption	1792.0607 1201.3975	1986.2494 1331.5815	0.10836
Domestic Intermediate Use	1837.2129 1231.6675	1885.4949 1264.0356	0.02628
Intra-Ind. Trade Index	0.2861	0.3412	0.19251

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.17
Employment subsidy - subsidy experiment for industry 17 - NON-METALLIC MINERAL PRODUCTION with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	3532.7637 1684.7749	3667.4367 1749.0005	0.03812
Consumer Price	0.9866	0.9742	-0.01262
Value-Added	1406.7145 670.8621	1471.6594 701.8342	0.04617
Employment	841.5868 401.3525	938.9983 447.8081	0.11575
Capital Requirements	5802.1720	6382.7687	0.10006
No. of Firms	410.8324 195.9260	451.9425 215.5314	0.10007
Mark-Up	0.3266	0.3480	0.06543
Unit Cost	0.6964	0.6767	-0.02827
Average Fixed Cost	0.2201	0.2283	0.03688
Length of Production Run	4.2995	4.0574	-0.05631
Scale Elasticity	0.7598	0.7478	-0.01585
Kap / Lab Ratio	6.8943	6.7974	-0.01406
Labour Productivity	4.1977	3.9057	-0.06957
Total Factor Productivity	7.1400	7.0210	-0.01667
Exports	508.0084 242.2692	582.8236 277.9485	0.14727
Imports	466.0102 222.2402	462.5619 220.5958	-0.00740
Final Consumption	245.6371 117.1443	253.0090 120.6600	0.03001
Domestic Intermediate Use	2737.2681 1305.4031	2775.5257 1323.6482	0.01398
Intra-Ind. Trade Index	0.9569	0.8850	-0.07516

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.18
Employment subsidy - subsidy experiment for industry 18 - PETROLEUM AND COAL with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	6217.8022 1866.5840	6236.6542 1872.2434	0.00303
Consumer Price	1.6242	1.6203	-0.00238
Value-Added	951.1030 285.5210	962.9549 289.0789	0.01246
Employment	318.9042 95.7350	352.5788 105.8441	0.10559
Capital Requirements	6178.1595	6304.8977	0.02051
No. of Firms	81.2425 24.3890	85.3458 25.6208	0.05051
Mark-Up	-0.0871	-0.0855	-0.01805
Unit Cost	1.1572	1.1524	-0.00409
Average Fixed Cost	0.0469	0.0488	0.04015
Length of Production Run	38.2669	36.5376	-0.04519
Scale Elasticity	0.9611	0.9594	-0.00173
Kap / Lab Ratio	19.3731	17.8822	-0.07695
Labour Productivity	19.4974	17.6887	-0.09277
Total Factor Productivity	3.3171	3.3110	-0.00185
Exports	325.0272 97.5732	328.9873 98.7620	0.01218
Imports	187.3760 56.2503	186.3765 55.9502	-0.00533
Final Consumption	2646.0746 794.3516	2653.1492 796.4753	0.00267
Domestic Intermediate Use	3264.0475 979.8669	3271.3344 982.0544	0.00223
Intra-Ind. Trade Index	0.7314	0.7233	-0.01105

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.19
Employment subsidy - subsidy experiment for industry 19 - CHEMICAL PRODUCTS with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	4737.7894	4919.3268	0.03832
	2821.3535	2929.4590	
Consumer Price	1.1152	1.1020	-0.01185
Value-Added	1824.4724	1909.0159	0.04634
	1086.4731	1136.8188	
Employment	1058.4889	1190.0520	0.12429
	630.3301	708.6758	
Capital Requirements	7821.9587	8499.7061	0.08665
No. of Firms	575.0557	643.5488	0.11911
	342.4456	383.2332	
Mark-Up	0.1750	0.1889	0.07963
Unit Cost	0.8926	0.8717	-0.02343
Average Fixed Cost	0.1434	0.1520	0.06033
Length of Production Run	4.1194	3.8220	-0.07219
Scale Elasticity	0.8616	0.8515	-0.01173
Kap / Lab Ratio	7.3897	7.1423	-0.03348
Labour Productivity	4.4760	4.1337	-0.07647
Total Factor Productivity	7.7465	7.6656	-0.01045
Exports	541.0567	611.7145	0.13059
	322.1992	364.2759	
Imports	1739.6450	1698.5157	-0.02364
	1035.9585	1011.4661	
Final Consumption	1061.6471	1120.9784	0.05589
	632.2107	667.5425	
Domestic Intermediate Use	3160.2862	3208.1318	0.01514
	1881.9502	1910.4424	
Intra-Ind. Trade Index	0.4745	0.5296	0.11614

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.3.20
Employment subsidy - subsidy experiment for industry 20 - MISC.MANUFACTURING with a capital subsidy of 0.0 % and an employment subsidy of 10.00 % (individual industry statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	1995.1951 1365.5115	2275.7974 1557.5557	0.14064
Consumer Price	1.1055	1.0868	-0.01697
Value-Added	912.2758 624.3616	1045.3486 715.4365	0.14587
Employment	786.3784 538.1973	974.5955 667.0129	0.23935
Capital Requirements	1591.0457	2021.2090	0.27037
No. of Firms	1489.3786 1019.3306	1944.9157 1331.1001	0.30586
Mark-Up	0.1396	0.1597	0.14409
Unit Cost	0.8871	0.8569	-0.03401
Average Fixed Cost	0.1483	0.1609	0.08502
Length of Production Run	0.6698	0.5851	-0.12652
Scale Elasticity	0.8568	0.8419	-0.01734
Kap / Lab Ratio	2.0233	2.0739	0.02503
Labour Productivity	2.5372	2.3351	-0.07965
Total Factor Productivity	11.1488	10.9991	-0.01343
Exports	310.4587 212.4780	404.9387 277.1399	0.30432
Imports	1558.9661 1066.9563	1438.7127 984.6548	-0.07714
Final Consumption	933.9750 639.2124	1093.2804 748.2410	0.17057
Domestic Intermediate Use	754.1371 516.1313	775.0671 530.4558	0.02775
Intra-Ind. Trade Index	0.3321	0.4393	0.32256

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.1
Capital subsidy - subsidy experiment for industry 1 - FOOD AND BEVERAGE with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	16775.7789 6668.3711	16749.5547 6657.9453	-0.00156
Consumer Price	1.1651	1.1649	-0.00014
Value-Added	4793.2376 1905.3118	4786.7706 1902.7412	-0.00135
Employment	2705.0276 1075.2483	2773.4261 1102.4368	0.02529
Capital Requirements	21237.8728	22866.6182	0.07669
No. of Firms	1775.5443 705.7788	1911.7118 759.9053	0.07669
Mark-Up	0.2173	0.2175	0.00077
Unit Cost	0.8296	0.8293	-0.00028
Average Fixed Cost	0.1847	0.1847	0.00050
Length of Production Run	4.7241	4.3808	-0.07268
Scale Elasticity	0.8179	0.8178	-0.00014
Kap / Lab Ratio	7.8513	8.2449	0.05014
Labour Productivity	6.2017	6.0393	-0.02619
Total Factor Productivity	8.7406	8.6554	-0.00975
Exports	1512.9224 601.3865	1514.1396 601.8704	0.00080
Imports	1641.0919 652.3340	1636.7802 650.6201	-0.00263
Final Consumption	9681.8926 3848.5522	9662.8701 3840.9907	-0.00196
Domestic Intermediate Use	5595.7784 2224.3218	5587.1566 2220.8945	-0.00154
Intra-Ind. Trade Index	0.9594	0.9611	0.00179

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.2
Capital subsidy - subsidy experiment for industry 2 - TOBACCO with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	841.8869 465.0581	841.8025 465.0115	-0.00010
Consumer Price	2.1959	2.1957	-0.00007
Value-Added	280.5695 154.9866	280.5312 154.9654	-0.00014
Employment	173.3613 95.7648	177.6657 98.1425	0.02483
Capital Requirements	1107.8201	1187.7341	0.07214
No. of Firms	56.7507 31.3491	60.8444 33.6105	0.07214
Mark-Up	0.2582	0.2583	0.00008
Unit Cost	0.8164	0.8163	-0.00008
Average Fixed Cost	0.2053	0.2053	0.00001
Length of Production Run	7.4174	6.9177	-0.06738
Scale Elasticity	0.7991	0.7991	-0.00002
Kap / Lab Ratio	6.3902	6.6852	0.04616
Labour Productivity	4.8563	4.7381	-0.02432
Total Factor Productivity	7.9207	7.8558	-0.00819
Exports	58.5980 32.3695	58.6183 32.3807	0.00035
Imports	22.7014 12.5403	22.6897 12.5338	-0.00052
Final Consumption	622.8484 344.0613	622.7590 344.0120	-0.00014
Domestic Intermediate Use	161.9951 89.4861	161.9765 89.4758	-0.00011
Intra-Ind. Trade Index	0.5585	0.5581	-0.00062

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.3
Capital subsidy - subsidy experiment for industry 3 - RUBBER AND PLASTIC with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	2343.0204 1498.5957	2343.0732 1498.6294	0.00002
Consumer Price	1.0820	1.0819	-0.00004
Value-Added	926.3810 592.5132	926.4199 592.5381	0.00004
Employment	706.2784 451.7356	716.6009 458.3379	0.01462
Capital Requirements	2448.2814	2618.4682	0.06951
No. of Firms	313.8995 200.7701	335.7195 214.7262	0.06951
Mark-Up	0.2147	0.2147	0.00022
Unit Cost	0.8270	0.8269	-0.00008
Average Fixed Cost	0.1694	0.1694	0.00015
Length of Production Run	3.7321	3.4896	-0.06497
Scale Elasticity	0.8300	0.8300	-0.00004
Kap / Lab Ratio	3.4665	3.6540	0.05411
Labour Productivity	3.3174	3.2697	-0.01438
Total Factor Productivity	8.9304	8.8378	-0.01037
Exports	348.7674 223.0717	348.9286 223.1748	0.00046
Imports	1071.2525 685.1729	1071.0980 685.0742	-0.00014
Final Consumption	472.5799 302.2620	472.5377 302.2349	-0.00009
Domestic Intermediate Use	1523.2422 974.2656	1523.1633 974.2151	-0.00005
Intra-Ind. Trade Index	0.4912	0.4914	0.00046

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.4
Capital subsidy - subsidy experiment for industry 4 - LEATHER with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	455.4213 240.1436	460.9617 243.0651	0.01217
Consumer Price	1.1225	1.1197	-0.00245
Value-Added	230.1424 121.3540	232.9970 122.8593	0.01240
Employment	193.5392 102.0532	197.3566 104.0661	0.01972
Capital Requirements	444.9769	486.7140	0.09380
No. of Firms	1219.7109 643.1533	1313.9057 692.8223	0.07723
Mark-Up	0.1456	0.1483	0.01825
Unit Cost	0.9596	0.9551	-0.00475
Average Fixed Cost	0.1328	0.1347	0.01435
Length of Production Run	0.1867	0.1754	-0.06040
Scale Elasticity	0.8785	0.8764	-0.00233
Kap / Lab Ratio	2.2992	2.4662	0.07264
Labour Productivity	2.3531	2.3357	-0.00741
Total Factor Productivity	8.8088	8.7757	-0.00376
Exports	25.1177 13.2446	25.6100 13.5042	0.01960
Imports	451.2116 237.9239	447.7557 236.1016	-0.00766
Final Consumption	296.3051 156.2417	300.7049 158.5617	0.01485
Domestic Intermediate Use	136.2688 71.8545	136.9044 72.1897	0.00466
Intra-Ind. Trade Index	0.1055	0.1082	0.02598

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.5
Capital subsidy - subsidy experiment for industry 5 - TEXTILES with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	1993.9185 906.4353	2018.4744 917.5984	0.01232
Consumer Price	1.1838	1.1780	-0.00486
Value-Added	894.0876 406.4521	906.3056 412.0063	0.01367
Employment	610.4017 277.4885	620.6424 282.1438	0.01678
Capital Requirements	3006.3032	3373.4644	0.12213
No. of Firms	519.2180 236.0365	586.1551 266.4661	0.12892
Mark-Up	0.1287	0.1337	0.03876
Unit Cost	0.9691	0.9601	-0.00924
Average Fixed Cost	0.1139	0.1176	0.03240
Length of Production Run	1.9201	1.7218	-0.10329
Scale Elasticity	0.8948	0.8909	-0.00440
Kap / Lab Ratio	4.9251	5.4354	0.10362
Labour Productivity	3.2666	3.2522	-0.00439
Total Factor Productivity	8.2709	8.1982	-0.00879
Exports	173.5444 78.8933	179.7210 81.7012	0.03559
Imports	1552.0512 705.5623	1543.4355 701.6458	-0.00555
Final Consumption	495.9018 225.4370	506.7973 230.3900	0.02197
Domestic Intermediate Use	1339.3475 608.8672	1346.5579 612.1450	0.00538
Intra-Ind. Trade Index	0.2011	0.2086	0.03706

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.6
Capital subsidy - subsidy experiment for industry 6 - KNITTING MILLS with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	416.2433 111.0953	420.9515 112.3519	0.01131
Consumer Price	1.1100	1.1068	-0.00292
Value-Added	211.9988 56.5825	214.4486 57.2363	0.01156
Employment	172.6344 46.0761	175.7890 46.9181	0.01827
Capital Requirements	461.0133	506.8875	0.09951
No. of Firms	1786.4266 476.7971	1939.0498 517.5322	0.08543
Mark-Up	0.1364	0.1395	0.02292
Unit Cost	0.9724	0.9669	-0.00566
Average Fixed Cost	0.1267	0.1290	0.01817
Length of Production Run	0.1165	0.1085	-0.06829
Scale Elasticity	0.8847	0.8823	-0.00276
Kap / Lab Ratio	2.6705	2.8835	0.07978
Labour Productivity	2.4111	2.3946	-0.00684
Total Factor Productivity	5.5045	5.4839	-0.00374
Exports	8.8804 2.3702	9.0727 2.4215	0.02165
Imports	325.1761 86.7895	322.3352 86.0313	-0.00874
Final Consumption	268.0417 71.5403	272.1153 72.6276	0.01520
Domestic Intermediate Use	140.1652 37.4101	140.6018 37.5266	0.00311
Intra-Ind. Trade Index	0.0532	0.0548	0.02981

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.7

Capital subsidy - subsidy experiment for industry 7 - CLOTHING with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	2174.0773 469.8179	2174.0322 469.8083	-0.00002
Consumer Price	1.0418	1.0418	-0.00002
Value-Added	983.8587 212.6118	983.8398 212.6078	-0.00002
Employment	947.4243 204.7384	954.7622 206.3241	0.00774
Capital Requirements	818.9478	837.5567	0.02272
No. of Firms	1536.6269 332.0649	1571.5436 339.6104	0.02272
Mark-Up	0.2129	0.2129	0.00012
Unit Cost	0.8587	0.8586	-0.00004
Average Fixed Cost	0.1799	0.1800	0.00019
Length of Production Run	0.7074	0.6917	-0.02224
Scale Elasticity	0.8268	0.8267	-0.00004
Kap / Lab Ratio	0.8644	0.8772	0.01486
Labour Productivity	2.2947	2.2770	-0.00771
Total Factor Productivity	8.4904	8.4634	-0.00318
Exports	68.6147 14.8276	68.6315 14.8313	0.00024
Imports	694.2296 150.0230	694.0152 149.9767	-0.00031
Final Consumption	1916.2273 414.0967	1916.1723 414.0847	-0.00003
Domestic Intermediate Use	191.9675 41.4842	191.9598 41.4825	-0.00004
Intra-Ind. Trade Index	0.1799	0.1800	0.00050

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.8

Capital subsidy - subsidy experiment for industry 8 - WOOD with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	5276.5160 776.1753	5275.5391 776.0317	-0.00019
Consumer Price	1.0342	1.0342	-0.00002
Value-Added	1930.3990 283.9617	1930.0826 283.9150	-0.00016
Employment	1335.1390 196.3989	1361.0187 200.2058	0.01938
Capital Requirements	6332.5533	6775.7275	0.06998
No. of Firms	814.7452 119.8490	871.7639 128.2365	0.06998
Mark-Up	0.2566	0.2566	0.00012
Unit Cost	0.7807	0.7807	-0.00004
Average Fixed Cost	0.1928	0.1929	0.00021
Length of Production Run	3.2381	3.0258	-0.06558
Scale Elasticity	0.8019	0.8019	-0.00005
Kap / Lab Ratio	4.7430	4.9784	0.04964
Labour Productivity	3.9520	3.8762	-0.01920
Total Factor Productivity	6.4294	6.3555	-0.01149
Exports	2185.2450 321.4495	2185.4710 321.4827	0.00010
Imports	402.6484 59.2296	402.4725 59.2037	-0.00044
Final Consumption	217.8892 32.0515	217.7736 32.0345	-0.00053
Domestic Intermediate Use	2831.1037 416.4553	2829.9744 416.2891	-0.00040
Intra-Ind. Trade Index	0.3112	0.3110	-0.00046

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.9
Capital subsidy - subsidy experiment for industry 9 - FURNITURE AND FIXTURES with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	1164.6704 614.7129	1170.5059 617.7930	0.00501
Consumer Price	1.1860	1.1842	-0.00146
Value-Added	597.6987 315.4653	600.6910 317.0447	0.00501
Employment	515.0652 271.8513	522.4195 275.7329	0.01428
Capital Requirements	1043.8085	1118.2385	0.07131
No. of Firms	1628.4961 859.5200	1721.6486 908.6860	0.05720
Mark-Up	0.1891	0.1907	0.00856
Unit Cost	0.9024	0.8999	-0.00282
Average Fixed Cost	0.1624	0.1634	0.00622
Length of Production Run	0.3576	0.3399	-0.04937
Scale Elasticity	0.8475	0.8463	-0.00138
Kap / Lab Ratio	2.0266	2.1405	0.05623
Labour Productivity	2.2612	2.2405	-0.00914
Total Factor Productivity	10.6048	10.5548	-0.00472
Exports	39.8106 21.0120	40.3609 21.3025	0.01382
Imports	348.7746 184.0832	345.0887 182.1378	-0.01057
Final Consumption	965.5356 509.6096	970.5216 512.2412	0.00516
Domestic Intermediate Use	162.0349 85.5220	162.3165 85.6707	0.00174
Intra-Ind. Trade Index	0.2049	0.2094	0.02207

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.10
Capital subsidy - subsidy experiment for industry 10 - PAPER AND ALLIED PRODUCTS with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	5963.9675 1782.6299	6117.4217 1828.4973	0.02573
Consumer Price	1.1689	1.1609	-0.00685
Value-Added	2807.9683 839.3015	2885.2763 862.4089	0.02753
Employment	1640.2393 490.2673	1688.2634 504.6218	0.02928
Capital Requirements	11937.1586	13663.3569	0.14461
No. of Firms	438.8499 131.1722	510.2461 152.5125	0.16269
Mark-Up	0.1558	0.1637	0.05117
Unit Cost	0.9306	0.9179	-0.01366
Average Fixed Cost	0.1360	0.1414	0.03974
Length of Production Run	6.7950	5.9946	-0.11780
Scale Elasticity	0.8725	0.8665	-0.00685
Kap / Lab Ratio	7.2777	8.0931	0.11205
Labour Productivity	3.6360	3.6235	-0.00345
Total Factor Productivity	6.8556	6.7601	-0.01392
Exports	2764.8852 826.4241	2885.2688 862.4067	0.04354
Imports	724.8558 216.6594	716.9642 214.3006	-0.01089
Final Consumption	431.7872 129.0612	437.7314 130.8379	0.01377
Domestic Intermediate Use	2961.4145 885.1667	2978.4840 890.2688	0.00576
Intra-Ind. Trade Index	0.4154	0.3981	-0.04178

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.11
Capital subsidy - subsidy experiment for industry 11 - PRINTING AND PUBLISHING with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	3407.5770 1668.0088	3406.8578 1667.6567	-0.00021
Consumer Price	0.9739	0.9739	-0.00004
Value-Added	1722.5632 843.1946	1722.1918 843.0127	-0.00022
Employment	1443.5547 706.6199	1461.6509 715.4780	0.01254
Capital Requirements	3376.6068	3568.2363	0.05675
No. of Firms	1287.9029 630.4282	1360.9940 666.2065	0.05675
Mark-Up	0.2602	0.2602	0.00018
Unit Cost	0.7680	0.7679	-0.00007
Average Fixed Cost	0.1936	0.1936	0.00011
Length of Production Run	1.3229	1.2516	-0.05390
Scale Elasticity	0.7987	0.7986	-0.00004
Kap / Lab Ratio	2.3391	2.4412	0.04367
Labour Productivity	2.3605	2.3308	-0.01259
Total Factor Productivity	5.4869	5.4339	-0.00965
Exports	139.0864 68.0828	139.1344 68.1063	0.00035
Imports	402.8952 197.2172	402.7328 197.1377	-0.00040
Final Consumption	1023.7717 501.1362	1023.5112 501.0085	-0.00025
Domestic Intermediate Use	2240.0903 1096.5242	2239.5769 1096.2727	-0.00023
Intra-Ind. Trade Index	0.5133	0.5135	0.00056

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.12
Capital subsidy - subsidy experiment for industry 12 - PRIMARY METALS with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	8090.9181 5188.7031	8095.5922 5191.7031	0.00058
Consumer Price	1.5967	1.5965	-0.00012
Value-Added	2558.2964 1640.6353	2560.1840 1641.8459	0.00074
Employment	1628.3703 1044.2737	1651.5064 1059.1108	0.01421
Capital Requirements	9666.1717	10539.9405	0.09039
No. of Firms	118.2894 75.8590	128.9821 82.7162	0.09039
Mark-Up	0.1884	0.1885	0.00081
Unit Cost	0.8603	0.8600	-0.00025
Average Fixed Cost	0.1537	0.1538	0.00071
Length of Production Run	34.1997	31.3826	-0.08237
Scale Elasticity	0.8484	0.8483	-0.00015
Kap / Lab Ratio	5.9361	6.3820	0.07512
Labour Productivity	4.9687	4.9019	-0.01344
Total Factor Productivity	6.7907	6.6905	-0.01477
Exports	2294.3769 1471.3838	2299.1651 1474.4543	0.00209
Imports	1260.6824 808.4756	1260.4701 808.3394	-0.00017
Final Consumption	3.8557 2.4727	3.8583 2.4743	0.00068
Domestic Intermediate Use	5842.7567 3746.9597	5842.4647 3746.7725	-0.00005
Intra-Ind. Trade Index	0.7092	0.7082	-0.00145

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.13
Capital subsidy - subsidy experiment for industry 13- METAL FABRICATING with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	6753.7112 4075.1892	6784.9923 4094.0642	0.00463
Consumer Price	1.0821	1.0802	-0.00181
Value-Added	3072.1537 1853.7373	3087.7520 1863.1494	0.00508
Employment	2423.6437 1462.4265	2463.6253 1486.5513	0.01650
Capital Requirements	7384.0442	7995.5968	0.08282
No. of Firms	3038.2698 1833.2920	3266.2411 1970.8499	0.07503
Mark-Up	0.1930	0.1952	0.01146
Unit Cost	0.8514	0.8482	-0.00365
Average Fixed Cost	0.1582	0.1595	0.00824
Length of Production Run	1.1114	1.0387	-0.06549
Scale Elasticity	0.8433	0.8417	-0.00187
Kap / Lab Ratio	3.0467	3.2455	0.06525
Labour Productivity	2.7866	2.7541	-0.01167
Total Factor Productivity	7.0012	6.9507	-0.00722
Exports	719.6038 434.2087	735.7736 443.9656	0.02247
Imports	2185.7996 1318.9114	2173.8205 1311.6831	-0.00548
Final Consumption	1081.1364 652.3577	1090.8572 658.2231	0.00899
Domestic Intermediate Use	4964.1052 2995.3411	4968.4339 2997.9529	0.00087
Intra-Ind. Trade Index	0.4954	0.5058	0.02100

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.14
Capital subsidy - subsidy experiment for industry 14 - MACHINERY with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	2678.4349 1773.9272	2718.3764 1800.3806	0.01491
Consumer Price	1.0861	1.0842	-0.00172
Value-Added	1244.6664 824.3425	1263.8514 837.0486	0.01541
Employment	1020.1497 675.6450	1045.7557 692.6038	0.02510
Capital Requirements	2645.6770	2889.3613	0.09211
No. of Firms	988.9528 654.9834	1068.7604 707.8398	0.08070
Mark-Up	0.1703	0.1724	0.01233
Unit Cost	0.8949	0.8918	-0.00351
Average Fixed Cost	0.1460	0.1473	0.00900
Length of Production Run	1.3542	1.2717	-0.06087
Scale Elasticity	0.8598	0.8583	-0.00176
Kap / Lab Ratio	2.5934	2.7629	0.06537
Labour Productivity	2.6255	2.5994	-0.00994
Total Factor Productivity	9.4004	9.3480	-0.00558
Exports	696.3384 461.1848	713.3844 472.4744	0.02448
Imports	4695.4700 3109.8096	4674.8426 3096.1482	-0.00439
Final Consumption	936.5277 620.2622	956.3823 633.4119	0.02120
Domestic Intermediate Use	1077.0273 713.3152	1079.6628 715.0605	0.00245
Intra-Ind. Trade Index	0.2583	0.2648	0.02516

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.15
Capital subsidy - subsidy experiment for industry 15 - TRANSPORTATION EQUIPMENT with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	23867.5728 19122.6992	23869.4486 19124.1992	0.00008
Consumer Price	1.0486	1.0485	-0.00004
Value-Added	5763.1671 4617.4492	5764.1845 4618.2617	0.00018
Employment	2978.4380 2386.3245	3105.5858 2488.1953	0.04269
Capital Requirements	28001.2078	29865.9718	0.06660
No. of Firms	453.7257 363.5249	483.9420 387.7341	0.06660
Mark-Up	0.2640	0.2641	0.00023
Unit Cost	0.7650	0.7649	-0.00009
Average Fixed Cost	0.1987	0.1987	0.00019
Length of Production Run	26.3018	24.6615	-0.06236
Scale Elasticity	0.7938	0.7938	-0.00006
Kap / Lab Ratio	9.4013	9.6169	0.02293
Labour Productivity	8.0135	7.6860	-0.04087
Total Factor Productivity	11.1492	11.0164	-0.01191
Exports	15645.9895 12535.5664	15658.8845 12545.8945	0.00082
Imports	9955.5703 7976.4023	9944.4017 7967.4531	-0.00112
Final Consumption	5022.2397 4023.8184	5011.4105 4015.1421	-0.00216
Domestic Intermediate Use	2664.7578 2135.0039	2663.4103 2133.9243	-0.00051
Intra-Ind. Trade Index	0.7777	0.7768	-0.00119

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.16
Capital subsidy - subsidy experiment for industry 16 - ELECTRICAL PRODUCTS with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	4043.6264 2710.8469	4092.1224 2743.3586	0.01199
Consumer Price	1.1418	1.1381	-0.00329
Value-Added	2066.6396 1385.4751	2091.7148 1402.2854	0.01213
Employment	1626.4676 1090.3838	1660.2782 1113.0503	0.02079
Capital Requirements	5001.7634	5500.5635	0.09973
No. of Firms	2325.7940 1559.2122	2532.9454 1698.0864	0.08907
Mark-Up	0.1704	0.1743	0.02253
Unit Cost	0.9011	0.8952	-0.00654
Average Fixed Cost	0.1471	0.1496	0.01684
Length of Production Run	0.8693	0.8078	-0.07077
Scale Elasticity	0.8597	0.8568	-0.00329
Kap / Lab Ratio	3.0752	3.3130	0.07733
Labour Productivity	2.4861	2.4647	-0.00862
Total Factor Productivity	8.8182	8.7719	-0.00525
Exports	437.0124 292.9729	449.0010 301.0103	0.02743
Imports	2617.9678 1755.0854	2587.3307 1734.5464	-0.01170
Final Consumption	1792.0607 1201.3975	1821.6786 1221.2532	0.01653
Domestic Intermediate Use	1837.2129 1231.6675	1843.3206 1235.7620	0.00332
Intra-Ind. Trade Index	0.2861	0.2958	0.03374

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.17
Capital subsidy - subsidy experiment for industry 17 - NON-METALLIC MINERAL PRODUCTION with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	3532.7637 1684.7749	3531.6458 1684.2417	-0.00032
Consumer Price	0.9866	0.9866	-0.00002
Value-Added	1406.7145 670.8621	1406.2843 670.6570	-0.00031
Employment	841.5868 401.3525	856.4919 408.4609	0.01771
Capital Requirements	5802.1720	6294.1992	0.08480
No. of Firms	410.8324 195.9260	445.6712 212.5406	0.08480
Mark-Up	0.3266	0.3266	0.00012
Unit Cost	0.6964	0.6964	-0.00005
Average Fixed Cost	0.2201	0.2202	0.00011
Length of Production Run	4.2995	3.9622	-0.07846
Scale Elasticity	0.7598	0.7598	-0.00004
Kap / Lab Ratio	6.8943	7.3488	0.06592
Labour Productivity	4.1977	4.1234	-0.01771
Total Factor Productivity	7.1400	7.0061	-0.01875
Exports	508.0084 242.2692	508.1450 242.3344	0.00027
Imports	466.0102 222.2402	465.8171 222.1482	-0.00041
Final Consumption	245.6371 117.1443	245.5162 117.0867	-0.00049
Domestic Intermediate Use	2737.2681 1305.4031	2736.1097 1304.8506	-0.00042
Intra-Ind. Trade Index	0.9569	0.9565	-0.00036

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.18
Capital subsidy - subsidy experiment for industry 18 - PETROLEUM AND COAL with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	6217.8022 1866.5840	6226.6612 1869.2437	0.00142
Consumer Price	1.6242	1.6183	-0.00360
Value-Added	951.1030 285.5210	965.7786 289.9265	0.01543
Employment	318.9042 95.7350	321.9037 96.6355	0.00941
Capital Requirements	6178.1595	6999.1126	0.13288
No. of Firms	81.2425 24.3890	95.0911 28.5463	0.17046
Mark-Up	-0.0871	-0.0847	-0.02701
Unit Cost	1.1572	1.1500	-0.00616
Average Fixed Cost	0.0469	0.0497	0.05974
Length of Production Run	38.2669	32.7405	-0.14442
Scale Elasticity	0.9611	0.9586	-0.00258
Kap / Lab Ratio	19.3731	21.7429	0.12232
Labour Productivity	19.4974	19.3432	-0.00791
Total Factor Productivity	3.3171	3.2968	-0.00612
Exports	325.0272 97.5732	331.0571 99.3833	0.01855
Imports	187.3760 56.2503	185.3041 55.6283	-0.01106
Final Consumption	2646.0746 794.3516	2644.6788 793.9324	-0.00053
Domestic Intermediate Use	3264.0475 979.8669	3267.4607 980.8916	0.00105
Intra-Ind. Trade Index	0.7314	0.7177	-0.01864

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.19
Capital subsidy - subsidy experiment for industry 19 - CHEMICAL PRODUCTS with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	4737.7894 2821.3535	4787.6624 2851.0527	0.01053
Consumer Price	1.1152	1.1109	-0.00390
Value-Added	1824.4724 1086.4731	1848.3022 1100.6638	0.01306
Employment	1058.4889 630.3301	1077.6085 641.7158	0.01806
Capital Requirements	7821.9587	8772.3529	0.12150
No. of Firms	575.0557 342.4456	646.8112 385.1760	0.12478
Mark-Up	0.1750	0.1795	0.02571
Unit Cost	0.8926	0.8858	-0.00769
Average Fixed Cost	0.1434	0.1462	0.01970
Length of Production Run	4.1194	3.7010	-0.10158
Scale Elasticity	0.8616	0.8583	-0.00381
Kap / Lab Ratio	7.3897	8.1406	0.10160
Labour Productivity	4.4760	4.4429	-0.00740
Total Factor Productivity	7.7465	7.6333	-0.01460
Exports	541.0567 322.1992	563.2810 335.4338	0.04108
Imports	1739.6450 1035.9585	1722.3974 1025.6875	-0.00991
Final Consumption	1061.6471 632.2107	1077.4197 641.6033	0.01486
Domestic Intermediate Use	3160.2862 1881.9502	3171.0937 1888.3862	0.00342
Intra-Ind. Trade Index	0.4745	0.4929	0.03881

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.4.20
Capital subsidy - subsidy experiment for industry 20 - MISC.MANUFACTURING with a capital subsidy of 10.00 % and an employment subsidy of 0.0 % (individual statistics)

Variable	Without Subsidy	With Subsidy	Percentage Change
Industry Output	1995.1951 1365.5115	2008.3164 1374.4917	0.00658
Consumer Price	1.1055	1.1045	-0.00088
Value-Added	912.2758 624.3616	918.4940 628.6172	0.00682
Employment	786.3784 538.1973	799.4470 547.1414	0.01662
Capital Requirements	1591.0457	1702.9322	0.07032
No. of Firms	1489.3786 1019.3306	1579.6497 1081.1121	0.06061
Mark-Up	0.1396	0.1406	0.00726
Unit Cost	0.8871	0.8855	-0.00177
Average Fixed Cost	0.1483	0.1489	0.00453
Length of Production Run	0.6698	0.6357	-0.05095
Scale Elasticity	0.8568	0.8560	-0.00090
Kap / Lab Ratio	2.0233	2.1301	0.05283
Labour Productivity	2.5372	2.5121	-0.00988
Total Factor Productivity	11.1488	11.0891	-0.00536
Exports	310.4587 212.4780	314.7419 215.4093	0.01380
Imports	1558.9661 1066.9563	1552.2704 1062.3738	-0.00430
Final Consumption	933.9750 639.2124	941.7072 644.5044	0.00828
Domestic Intermediate Use	754.1371 516.1313	755.0147 516.7319	0.00116
Intra-Ind. Trade Index	0.3321	0.3372	0.01511

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.1
Entry prevention - industry rationalization experiment for industry 1 - FOOD AND BEVERAGE with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	16775.7789 6668.3711	16883.8639 6711.3320	0.00644
Consumer Price	1.1651	1.1653	0.00013
Value-Added	4793.2376 1905.3118	4823.5132 1917.3464	0.00632
Employment	2705.0275 1075.2483	2257.9395 897.5308	-0.16528
Capital Requirements	21237.8727	10618.9364	-0.50000
No. of Firms	1775.5443 705.7788	887.7721 352.8894	-0.50000
Mark-Up	0.2173	0.2172	-0.00055
Unit Cost	0.8296	0.8298	0.00022
Average Fixed Cost	0.1847	0.0918	-0.50311
Length of Production Run	4.7241	9.5091	1.01289
Scale Elasticity	0.8179	0.9004	0.10086
Kap / Lab Ratio	7.8513	4.7029	-0.40100
Labour Productivity	6.2017	7.4776	0.20573
Total Factor Productivity	8.7406	9.4792	0.08450
Exports	1512.9224 601.3865	1511.8549 600.9622	-0.00071
Imports	1641.0919 652.3340	1654.1432 657.5217	0.00795
Final Consumption	9681.8926 3848.5522	9756.4341 3878.1824	0.00770
Domestic Intermediate Use	5595.7784 2224.3218	5630.5670 2238.1501	0.00622
Intra-Ind. Trade Index	0.9594	0.9551	-0.00449
Industry Profits	0.1401 0.0557	1567.6162 623.1274	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.2

Entry prevention - industry rationalization experiment for industry 2 - TOBACCO with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	841.8869 465.0581	841.4970 464.8428	-0.00046
Consumer Price	2.1959	2.1967	0.00040
Value-Added	280.5695 154.9866	280.7657 155.0950	0.00070
Employment	173.3613 95.7648	143.5175 79.2791	-0.17215
Capital Requirements	1107.8201	553.9101	-0.50000
No. of Firms	56.7507 31.3491	28.3753 15.6745	-0.50000
Mark-Up	0.2582	0.2587	0.00180
Unit Cost	0.8164	0.8164	0.00002
Average Fixed Cost	0.2053	0.1027	-0.49980
Length of Production Run	7.4174	14.8280	0.99907
Scale Elasticity	0.7991	0.8883	0.11164
Kap / Lab Ratio	6.3902	3.8595	-0.39603
Labour Productivity	4.8563	5.8634	0.20739
Total Factor Productivity	7.9207	8.5127	0.07474
Exports	58.5980 32.3695	58.4788 32.3037	-0.00203
Imports	22.7014 12.5403	22.7446 12.5641	0.00190
Final Consumption	622.8484 344.0613	622.7310 343.9966	-0.00019
Domestic Intermediate Use	161.9951 89.4861	161.8612 89.4121	-0.00083
Intra-Ind. Trade Index	0.5585	0.5600	0.00284
Industry Profits	-0.0006 -0.0003	86.6648 47.8736	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.3
Entry prevention - industry rationalization experiment for industry 3 - RUBBER AND PLASTIC with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	2343.0204 1498.5957	2344.7773 1499.7195	0.00075
Consumer Price	1.0820	1.0819	-0.00004
Value-Added	926.3810 592.5132	927.1092 592.9790	0.00079
Employment	706.2784 451.7356	632.9936 404.8625	-0.10376
Capital Requirements	2448.2814	1224.1407	-0.50000
No. of Firms	313.8995 200.7701	156.9497 100.3850	-0.50000
Mark-Up	0.2147	0.2148	0.00027
Unit Cost	0.8270	0.8269	-0.00008
Average Fixed Cost	0.1694	0.0846	-0.50041
Length of Production Run	3.7321	7.4698	1.00150
Scale Elasticity	0.8300	0.9072	0.09297
Kap / Lab Ratio	3.4665	1.9339	-0.44211
Labour Productivity	3.3174	3.7043	0.11661
Total Factor Productivity	8.9304	9.8286	0.10057
Exports	348.7674 223.0717	348.9182 223.1681	0.00043
Imports	1071.2525 685.1729	1071.9008 685.5876	0.00061
Final Consumption	472.5799 302.2620	473.0699 302.5754	0.00104
Domestic Intermediate Use	1523.2422 974.2656	1524.3465 974.9719	0.00072
Intra-Ind. Trade Index	0.4912	0.4912	-0.00013
Industry Profits	0.1330 0.0851	198.9122 127.2242	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.4
Entry prevention - industry rationalization experiment for industry 4 - LEATHER with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	455.4213 240.1436	455.5379 240.2052	0.00026
Consumer Price	1.1225	1.1224	-0.00004
Value-Added	230.1424 121.3540	230.2039 121.3865	0.00027
Employment	193.5392 102.0532	176.6319 93.1380	-0.08736
Capital Requirements	444.9769	310.1762	-0.30294
No. of Firms	1219.7109 643.1533	609.8554 321.5767	-0.50000
Mark-Up	0.1456	0.1457	0.00034
Unit Cost	0.9596	0.9596	-0.00008
Average Fixed Cost	0.1328	0.0664	-0.50017
Length of Production Run	0.1867	0.3735	1.00051
Scale Elasticity	0.8785	0.9353	0.06471
Kap / Lab Ratio	2.2992	1.7561	-0.23622
Labour Productivity	2.3531	2.5790	0.09600
Total Factor Productivity	8.8088	9.2567	0.05084
Exports	25.1177 13.2446	25.1254 13.2486	0.00030
Imports	451.2116 237.9239	451.1834 237.9090	-0.00006
Final Consumption	296.3051 156.2417	296.3876 156.2852	0.00028
Domestic Intermediate Use	136.2688 71.8545	136.2950 71.8684	0.00019
Intra-Ind. Trade Index	0.1055	0.1055	0.00035
Industry Profits	0.0376 0.0198	30.2901 15.9719	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.5
Entry prevention - industry rationalization experiment for industry 5 - TEXTILES with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	1993.9185 906.4353	1994.8227 906.8462	0.00045
Consumer Price	1.1838	1.1837	-0.00002
Value-Added	894.0876 406.4521	894.5016 406.6404	0.00046
Employment	610.4017 277.4885	579.4699 263.4270	-0.05067
Capital Requirements	3006.3032	2206.6960	-0.26598
No. of Firms	519.2180 236.0365	259.6090 118.0182	-0.50000
Mark-Up	0.1287	0.1287	0.00017
Unit Cost	0.9691	0.9690	-0.00004
Average Fixed Cost	0.1139	0.0569	-0.50024
Length of Production Run	1.9201	3.8420	1.00091
Scale Elasticity	0.8948	0.9445	0.05555
Kap / Lab Ratio	4.9251	3.8081	-0.22680
Labour Productivity	3.2666	3.4425	0.05386
Total Factor Productivity	8.2709	8.7079	0.05283
Exports	173.5444 78.8933	173.5659 78.9030	0.00012
Imports	1552.0512 705.5623	1552.6489 705.8340	0.00039
Final Consumption	495.9018 225.4370	496.1821 225.5644	0.00057
Domestic Intermediate Use	1339.3475 608.8672	1339.9489 609.1406	0.00045
Intra-Ind. Trade Index	0.2011	0.2011	-0.00023
Industry Profits	0.1073 0.0488	113.8066 51.7365	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.6
Entry prevention - industry rationalization experiment for industry 6 - KNITTING MILLS with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	416.2433 111.0953	416.3015 111.1109	0.00014
Consumer Price	1.1100	1.1100	-0.00001
Value-Added	211.9988 56.5825	212.0299 56.5908	0.00015
Employment	172.6344 46.0761	159.1004 42.4639	-0.07840
Capital Requirements	461.0133	332.2609	-0.27928
No. of Firms	1786.4266 476.7971	893.2133 238.3986	-0.50000
Mark-Up	0.1364	0.1364	0.00014
Unit Cost	0.9724	0.9724	-0.00003
Average Fixed Cost	0.1267	0.0633	-0.50009
Length of Production Run	0.1165	0.2330	1.00028
Scale Elasticity	0.8847	0.9388	0.06117
Kap / Lab Ratio	2.6705	2.0884	-0.21797
Labour Productivity	2.4111	2.6166	0.08522
Total Factor Productivity	5.5045	5.7672	0.04773
Exports	8.8804 2.3702	8.8813 2.3704	0.00009
Imports	325.1761 86.7895	325.1929 86.7940	0.00005
Final Consumption	268.0417 71.5403	268.0817 71.5510	0.00015
Domestic Intermediate Use	140.1652 37.4101	140.1826 37.4147	0.00012
Intra-Ind. Trade Index	0.0532	0.0532	0.00004
Industry Profits	0.0285 0.0076	26.4037 7.0471	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.7
Entry prevention - industry rationalization experiment for industry 7 - CLOTHING with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	2174.0773 469.8179	2177.4476 470.5464	0.00155
Consumer Price	1.0418	1.0415	-0.00032
Value-Added	983.8587 212.6118	985.4872 212.9638	0.00166
Employment	947.4243 204.7384	787.8267 170.2493	-0.16845
Capital Requirements	818.9478	409.4739	-0.50000
No. of Firms	1536.6269 332.0649	768.3135 166.0325	-0.50000
Mark-Up	0.2129	0.2133	0.00186
Unit Cost	0.8587	0.8581	-0.00064
Average Fixed Cost	0.1799	0.0897	-0.50132
Length of Production Run	0.7074	1.4170	1.00310
Scale Elasticity	0.8268	0.9053	0.09505
Kap / Lab Ratio	0.8644	0.5198	-0.39871
Labour Productivity	2.2947	2.7639	0.20444
Total Factor Productivity	8.4904	9.1941	0.08288
Exports	68.6147 14.8276	68.8370 14.8757	0.00324
Imports	694.2296 150.0230	692.7102 149.6947	-0.00219
Final Consumption	1916.2273 414.0967	1919.1481 414.7278	0.00152
Domestic Intermediate Use	191.9675 41.4842	192.1827 41.5307	0.00112
Intra-Ind. Trade Index	0.1799	0.1808	0.00495
Industry Profits	0.1356 0.0293	196.9957 42.5708	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.8
Entry prevention - industry rationalization experiment for industry 8 - WOOD with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	5276.5160 776.1753	5284.7624 777.3884	0.00156
Consumer Price	1.0342	1.0341	-0.00013
Value-Added	1930.3990 283.9617	1933.5715 284.4282	0.00164
Employment	1335.1390 196.3989	1150.8450 169.2893	-0.13803
Capital Requirements	6332.5533	3166.2766	-0.50000
No. of Firms	814.7452 119.8490	407.3726 59.9245	-0.50000
Mark-Up	0.2566	0.2568	0.00063
Unit Cost	0.7807	0.7805	-0.00026
Average Fixed Cost	0.1928	0.0962	-0.50086
Length of Production Run	3.2381	6.4864	1.00313
Scale Elasticity	0.8019	0.8902	0.11009
Kap / Lab Ratio	4.7430	2.7513	-0.41993
Labour Productivity	3.9520	4.5921	0.16195
Total Factor Productivity	6.4294	7.1362	0.10993
Exports	2185.2450 321.4495	2187.0260 321.7114	0.00082
Imports	402.6484 59.2296	403.3731 59.3362	0.00180
Final Consumption	217.8892 32.0515	218.4327 32.1314	0.00249
Domestic Intermediate Use	2831.1037 416.4553	2836.6930 417.2773	0.00197
Intra-Ind. Trade Index	0.3112	0.3114	0.00083
Industry Profits	0.5186 0.0763	511.1097 75.1842	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.9
Entry prevention - industry rationalization experiment for industry 9 - FURNITURE AND FIXTURES with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	1164.6704 614.7129	1165.3696 615.0820	0.00060
Consumer Price	1.1860	1.1858	-0.00010
Value-Added	597.6987 315.4653	598.0693 315.6609	0.00062
Employment	515.0652 271.8513	458.9151 242.2154	-0.10902
Capital Requirements	1043.8085	652.6823	-0.37471
No. of Firms	1628.4961 859.5200	814.2480 429.7600	-0.50000
Mark-Up	0.1891	0.1892	0.00073
Unit Cost	0.9024	0.9022	-0.00022
Average Fixed Cost	0.1624	0.0811	-0.50042
Length of Production Run	0.3576	0.7156	1.00120
Scale Elasticity	0.8475	0.9175	0.08262
Kap / Lab Ratio	2.0266	1.4222	-0.29820
Labour Productivity	2.2612	2.5394	0.12303
Total Factor Productivity	10.6048	11.3128	0.06677
Exports	39.8106 21.0120	39.8495 21.0325	0.00098
Imports	348.7746 184.0832	348.5976 183.9898	-0.00051
Final Consumption	965.5356 509.6096	966.1192 509.9177	0.00060
Domestic Intermediate Use	162.0349 85.5220	162.1104 85.5619	0.00047
Intra-Ind. Trade Index	0.2049	0.2052	0.00133
Industry Profits	0.0808 0.0427	94.8835 50.0795	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.10
Entry prevention - industry rationalization experiment for industry 10 - PAPER AND ALLIED PRODUCTS with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	5963.9675 1782.6299	5966.8177 1783.4817	0.00048
Consumer Price	1.1689	1.1690	0.00012
Value-Added	2807.9683 839.3015	2809.1684 839.6604	0.00043
Employment	1640.2393 490.2673	1563.8177 467.4250	-0.04659
Capital Requirements	11937.1586	8772.1139	-0.26514
No. of Firms	438.8499 131.1722	219.4249 65.5861	-0.50000
Mark-Up	0.1558	0.1556	-0.00097
Unit Cost	0.9306	0.9308	0.00025
Average Fixed Cost	0.1360	0.0680	-0.50019
Length of Production Run	6.7950	13.5965	1.00096
Scale Elasticity	0.8725	0.9320	0.06813
Kap / Lab Ratio	7.2777	5.6094	-0.22923
Labour Productivity	3.6360	3.8155	0.04937
Total Factor Productivity	6.8556	7.3306	0.06929
Exports	2764.8852 826.4241	2762.9192 825.8364	-0.00071
Imports	724.8558 216.6594	726.1838 217.0563	0.00183
Final Consumption	431.7872 129.0612	432.6077 129.3064	0.00190
Domestic Intermediate Use	2961.4145 885.1667	2965.5669 886.4077	0.00140
Intra-Ind. Trade Index	0.4154	0.4163	0.00202
Industry Profits	0.4990 0.1491	405.5208 121.2101	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.11
Entry prevention - industry rationalization experiment for industry 11 - PRINTING AND PUBLISHING with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	3407.5770 1668.0088	3412.7044 1670.5188	0.00150
Consumer Price	0.9739	0.9737	-0.00023
Value-Added	1722.5632 843.1946	1725.1536 844.4626	0.00150
Employment	1443.5547 706.6199	1284.5952 628.8093	-0.11012
Capital Requirements	3376.6068	1688.3034	-0.50000
No. of Firms	1287.9029 630.4282	643.9514 315.2141	-0.50000
Mark-Up	0.2602	0.2605	0.00122
Unit Cost	0.7680	0.7676	-0.00048
Average Fixed Cost	0.1936	0.0966	-0.50094
Length of Production Run	1.3229	2.6498	1.00301
Scale Elasticity	0.7987	0.8882	0.11211
Kap / Lab Ratio	2.3391	1.3143	-0.43813
Labour Productivity	2.3605	2.6566	0.12543
Total Factor Productivity	5.4869	6.0917	0.11024
Exports	139.0864 68.0828	139.3919 68.2323	0.00220
Imports	402.8952 197.2172	403.0623 197.2990	0.00042
Final Consumption	1023.7717 501.1362	1025.4778 501.9712	0.00167
Domestic Intermediate Use	2240.0903 1096.5242	2243.1634 1098.0283	0.00137
Intra-Ind. Trade Index	0.5133	0.5139	0.00132
Industry Profits	0.2079 0.1018	331.6218 162.3289	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.12
Entry prevention - industry rationalization experiment for industry 12 - PRIMARY METALS with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	8090.9181 5188.7031	8089.0782 5187.5234	-0.00023
Consumer Price	1.5967	1.5971	0.00021
Value-Added	2558.2964 1640.6353	2557.0417 1639.8308	-0.00049
Employment	1628.3703 1044.2737	1506.4874 966.1104	-0.07485
Capital Requirements	9666.1717	4833.0859	-0.50000
No. of Firms	118.2894 75.8590	59.1447 37.9295	-0.50000
Mark-Up	0.1884	0.1881	-0.00134
Unit Cost	0.8603	0.8606	0.00042
Average Fixed Cost	0.1537	0.0769	-0.49979
Length of Production Run	34.1997	68.3838	0.99955
Scale Elasticity	0.8484	0.9180	0.08202
Kap / Lab Ratio	5.9361	3.2082	-0.45955
Labour Productivity	4.9687	5.3695	0.08066
Total Factor Productivity	6.7907	7.6100	0.12065
Exports	2294.3769 1471.3838	2286.4691 1466.3125	-0.00345
Imports	1260.6824 808.4756	1262.2993 809.5125	0.00128
Final Consumption	3.8557 2.4727	3.8579 2.4741	0.00057
Domestic Intermediate Use	5842.7567 3746.9597	5849.1105 3751.0344	0.00109
Intra-Ind. Trade Index	0.7092	0.7114	0.00306
Industry Profits	0.5395 0.3460	620.6260 398.0073	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.13
Entry prevention - industry rationalization experiment for industry 13 - METAL FABRICATING with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	6753.7112 4075.1892	6770.6605 4085.4165	0.00251
Consumer Price	1.0821	1.0819	-0.00022
Value-Added	3072.1537 1853.7373	3080.0071 1858.4761	0.00256
Employment	2423.6437 1462.4265	2188.9525 1320.8137	-0.09683
Capital Requirements	7384.0442	4469.2611	-0.39474
No. of Firms	3038.2698 1833.2920	1519.1349 916.6460	-0.50000
Mark-Up	0.1930	0.1933	0.00137
Unit Cost	0.8514	0.8510	-0.00044
Average Fixed Cost	0.1582	0.0789	-0.50145
Length of Production Run	1.1114	2.2285	1.00502
Scale Elasticity	0.8433	0.9152	0.08525
Kap / Lab Ratio	3.0467	2.0417	-0.32985
Labour Productivity	2.7866	3.0931	0.10999
Total Factor Productivity	7.0012	7.5079	0.07237
Exports	719.6038 434.2087	721.5617 435.3901	0.00272
Imports	2185.7996 1318.9114	2189.0148 1320.8513	0.00147
Final Consumption	1081.1364 652.3577	1084.8745 654.6130	0.00346
Domestic Intermediate Use	4964.1052 2995.3411	4975.2316 3002.0547	0.00224
Intra-Ind. Trade Index	0.4954	0.4958	0.00094
Industry Profits	0.4183 0.2524	538.4936 324.9270	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.14
Entry prevention - industry rationalization experiment for industry 14 - MACHINERY with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	2678.4349 1773.9272	2682.7932 1776.8137	0.00163
Consumer Price	1.0861	1.0859	-0.00013
Value-Added	1244.6664 824.3425	1246.7318 825.7104	0.00166
Employment	1020.1497 675.6450	923.1561 611.4062	-0.09508
Capital Requirements	2645.6770	1674.5524	-0.36706
No. of Firms	988.9528 654.9834	494.4764 327.4917	-0.50000
Mark-Up	0.1703	0.1705	0.00089
Unit Cost	0.8949	0.8947	-0.00025
Average Fixed Cost	0.1460	0.0728	-0.50094
Length of Production Run	1.3542	2.7128	1.00325
Scale Elasticity	0.8598	0.9247	0.07553
Kap / Lab Ratio	2.5934	1.8139	-0.30056
Labour Productivity	2.6255	2.9061	0.10687
Total Factor Productivity	9.4004	9.9889	0.06260
Exports	696.3384 461.1848	697.5766 462.0049	0.00178
Imports	4695.4700 3109.8096	4697.2940 3111.0176	0.00039
Final Consumption	936.5277 620.2622	938.6409 621.6616	0.00226
Domestic Intermediate Use	1077.0273 713.3152	1078.0057 713.9631	0.00091
Intra-Ind. Trade Index	0.2583	0.2586	0.00121
Industry Profits	0.2489 0.1649	196.5915 130.2025	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.15
Entry prevention - industry rationalization experiment for industry 15 - TRANSPORTATION EQUIPMENT with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	23867.5728 19122.6992	24013.2390 19239.4062	0.00610
Consumer Price	1.0486	1.0484	-0.00021
Value-Added	5763.1671 4617.4492	5801.1686 4647.8945	0.00659
Employment	2978.4380 2386.3245	2036.3226 1631.5015	-0.31631
Capital Requirements	28001.2079	14000.6040	-0.50000
No. of Firms	453.7257 363.5249	226.8629 181.7625	-0.50000
Mark-Up	0.2640	0.2643	0.00112
Unit Cost	0.7650	0.7646	-0.00044
Average Fixed Cost	0.1987	0.0986	-0.50348
Length of Production Run	26.3018	52.9246	1.01221
Scale Elasticity	0.7938	0.8857	0.11577
Kap / Lab Ratio	9.4013	6.8754	-0.26867
Labour Productivity	8.0135	11.7925	0.47158
Total Factor Productivity	11.1492	12.5291	0.12376
Exports	15645.9895 12535.5664	15706.8980 12584.3633	0.00389
Imports	9955.5703 7976.4023	10021.4470 8029.1797	0.00662
Final Consumption	5022.2397 4023.8184	5083.3143 4072.7512	0.01216
Domestic Intermediate Use	2664.7578 2135.0039	2682.9684 2149.5942	0.00683
Intra-Ind. Trade Index	0.7777	0.7790	0.00166
Industry Profits	0.8903 0.7133	2405.9263 1927.6279	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.16
Entry prevention - industry rationalization experiment for industry 16 - ELECTRICAL PRODUCTS with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	4043.6264 2710.8469	4050.4333 2715.4104	0.00168
Consumer Price	1.1418	1.1416	-0.00017
Value-Added	2066.6396 1385.4751	2070.1235 1387.8105	0.00169
Employment	1626.4676 1090.3838	1486.9877 996.8765	-0.08576
Capital Requirements	5001.7634	3454.9533	-0.30925
No. of Firms	2325.7940 1559.2122	1162.8970 779.6060	-0.50000
Mark-Up	0.1704	0.1706	0.00117
Unit Cost	0.9011	0.9008	-0.00034
Average Fixed Cost	0.1471	0.0734	-0.50100
Length of Production Run	0.8693	1.7415	1.00337
Scale Elasticity	0.8597	0.9246	0.07560
Kap / Lab Ratio	3.0752	2.3235	-0.24446
Labour Productivity	2.4861	2.7239	0.09564
Total Factor Productivity	8.8182	9.3376	0.05890
Exports	437.0124 292.9729	437.6385 293.3928	0.00143
Imports	2617.9678 1755.0854	2619.4163 1756.0566	0.00055
Final Consumption	1792.0607 1201.3975	1795.7341 1203.8601	0.00205
Domestic Intermediate Use	1837.2129 1231.6675	1839.6806 1233.3218	0.00134
Intra-Ind. Trade Index	0.2861	0.2863	0.00075
Industry Profits	0.3053 0.2047	299.2442 200.6133	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.17
Entry prevention - industry rationalization experiment for industry 17 - NON-METALLIC MINERAL PRODUCTION with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	3532.7637 1684.7749	3537.0654 1686.8264	0.00122
Consumer Price	0.9866	0.9867	0.00010
Value-Added	1406.7145 670.8621	1408.3272 671.6311	0.00115
Employment	841.5868 401.3525	753.3165 359.2566	-0.10489
Capital Requirements	5802.1720	2901.0860	-0.50000
No. of Firms	410.8324 195.9260	205.4162 97.9630	-0.50000
Mark-Up	0.3266	0.3264	-0.00054
Unit Cost	0.6964	0.6966	0.00024
Average Fixed Cost	0.2201	0.1100	-0.50056
Length of Production Run	4.2995	8.6095	1.00243
Scale Elasticity	0.7598	0.8637	0.13669
Kap / Lab Ratio	6.8943	3.8511	-0.44141
Labour Productivity	4.1977	4.6953	0.11854
Total Factor Productivity	7.1400	8.2890	0.16092
Exports	508.0084 242.2692	507.4397 241.9980	-0.00112
Imports	466.0102 222.2402	466.7652 222.6003	0.00162
Final Consumption	245.6371 117.1443	246.1053 117.3676	0.00191
Domestic Intermediate Use	2737.2681 1305.4031	2741.7741 1307.5520	0.00165
Intra-Ind. Trade Index	0.9569	0.9582	0.00143
Industry Profits	0.0873 0.0416	389.5787 185.7901	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.18
Entry prevention - industry rationalization experiment for industry 18 - PETROLEUM AND COAL with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	6217.8022 1866.5840	6221.3191 1867.6399	0.00057
Consumer Price	1.6242	1.6243	0.00010
Value-Added	951.1030 285.5210	951.8077 285.7327	0.00074
Employment	318.9042 95.7350	308.3945 92.5800	-0.03296
Capital Requirements	6178.1595	4887.7560	-0.20887
No. of Firms	81.2425 24.3890	40.6213 12.1945	-0.50000
Mark-Up	-0.0871	-0.0871	-0.00013
Unit Cost	1.1572	1.1573	0.00009
Average Fixed Cost	0.0469	0.0234	-0.50027
Length of Production Run	38.2669	76.5771	1.00113
Scale Elasticity	0.9611	0.9802	0.01987
Kap / Lab Ratio	19.3731	15.8490	-0.18190
Labour Productivity	19.4974	20.1732	0.03466
Total Factor Productivity	3.3171	3.3900	0.02196
Exports	325.0272 97.5732	324.8664 97.5249	-0.00050
Imports	187.3760 56.2503	187.5441 56.3008	0.00090
Final Consumption	2646.0746 794.3516	2648.2411 795.0020	0.00082
Domestic Intermediate Use	3264.0475 979.8669	3265.5801 980.3269	0.00047
Intra-Ind. Trade Index	0.7314	0.7320	0.00088
Industry Profits	0.2070 0.0622	146.1873 43.8854	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.19
Entry prevention - industry rationalization experiment for industry 19 - CHEMICAL PRODUCTS with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	4737.7894 2821.3535	4741.3120 2823.4512	0.00074
Consumer Price	1.1152	1.1154	0.00016
Value-Added	1824.4724 1086.4731	1825.6579 1087.1792	0.00065
Employment	1058.4889 630.3301	999.8355 595.4019	-0.05541
Capital Requirements	7821.9587	5121.2213	-0.34528
No. of Firms	575.0557 342.4456	287.5279 171.2228	-0.50000
Mark-Up	0.1750	0.1748	-0.00099
Unit Cost	0.8926	0.8929	0.00031
Average Fixed Cost	0.1434	0.0717	-0.50031
Length of Production Run	4.1194	8.2450	1.00149
Scale Elasticity	0.8616	0.9257	0.07442
Kap / Lab Ratio	7.3897	5.1221	-0.30687
Labour Productivity	4.4760	4.7421	0.05945
Total Factor Productivity	7.7465	8.4066	0.08522
Exports	541.0567 322.1992	540.1783 321.6760	-0.00162
Imports	1739.6450 1035.9585	1742.6467 1037.7458	0.00173
Final Consumption	1061.6471 632.2107	1063.0350 633.0371	0.00131
Domestic Intermediate Use	3160.2862 1881.9502	3163.3397 1883.7686	0.00097
Intra-Ind. Trade Index	0.4745	0.4733	-0.00255
Industry Profits	0.2110 0.1257	339.7817 202.3400	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

TABLE E5.5.20
Entry prevention - industry rationalization experiment for industry 20 - MISC.MANUFACTURING with number of firms restricted to 0.500 the number in the free equilibrium (individual industry statistics)

Variable	Free Entry	Restricted Entry	Percentage Change
Industry Output	1995.1951 1365.5115	1998.1202 1367.5134	0.00147
Consumer Price	1.1055	1.1054	-0.00014
Value-Added	912.2758 624.3616	913.6478 625.3005	0.00150
Employment	786.3784 538.1973	704.1684 481.9329	-0.10454
Capital Requirements	1591.0457	934.2452	-0.41281
No. of Firms	1489.3786 1019.3306	744.6893 509.6653	-0.50000
Mark-Up	0.1396	0.1398	0.00118
Unit Cost	0.8871	0.8869	-0.00028
Average Fixed Cost	0.1483	0.0740	-0.50088
Length of Production Run	0.6698	1.3416	1.00293
Scale Elasticity	0.8568	0.9230	0.07725
Kap / Lab Ratio	2.0233	1.3267	-0.34426
Labour Productivity	2.5372	2.8376	0.11838
Total Factor Productivity	11.1488	11.8935	0.06679
Exports	310.4587 212.4780	311.1387 212.9433	0.00219
Imports	1558.9661 1066.9563	1558.6492 1066.7395	-0.00020
Final Consumption	933.9750 639.2124	935.6188 640.3374	0.00176
Domestic Intermediate Use	754.1371 516.1313	754.7024 516.5183	0.00075
Intra-Ind. Trade Index	0.3321	0.3328	0.00200
Industry Profits	0.1889 0.1293	148.7388 101.7968	

Note: For each variable, the first line reports all Canada. The second line represents Ontario.

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ECONOMICS

Ontario Economic Council Research Studie[s]

31 Trade, Industrial Policy, and Canadian Manufacturing

RICHARD G. HARRIS with DAVID COX

This study is an innovative and original approach to the often debated questions of whether trade liberalization and various types of industrial policies would result in positive or negative net income gains for Canada. Harris and Cox present a general equilibrium trade model consisting of thirty industrial sectors. The industrial structure of the Canadian economy is explicitly modelled through the direct incorporation of production cost estimates and scale elasticities. Thus the model indicates the effects of trade liberalization and industrial policies on the output of each sector, and also on the number of firms within each industry. Harris and Cox use their model to examine the impact of several trade liberalization alternatives, including sectoral free trade, as well specific industrial policies such as export subsidies, import replacement programs, capit[al] subsidies, wage subsidies, and industrial rationalization schemes.

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